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Occasional Papers on the Kinds of Plants

By L. H. Bailey

Revision of the Palmettoes

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186. SABAL UMBRACULIFERA in northern Haiti, a columnar majestic palmetto much planted around the globe. Peak of a house at lower left; sprawling Cecropia tree at base of palm.

L. H. Bailey
2-28-44

ARTICLE 11.
REVISION OF THE AMERICAN PALMETTOES.

Some ten years ago I wrote on the American palmettoes, meaning the genera Sabal and Serenoa: Gentes Herbarum, iii, fascicle vi. That monograph is now out of print. In the meantime I have collected palmettoes from Key West around to Texas, in several of the West Indies islands, in Colombia, and on a number of trips in Mexico to the Guatemalan border. Material has come to me from several collectors, and I have seen the specimens in our large herbaria. I have published other species than were then known. The genus Sabal begins to take cohesive shape in my mind, the old riddle of *Sabal mexicana* is now apparently resolvable, ardent growing collections in many regions have been studied, bundles of sterile and fragmentary material in my herbarium have been burned, and now the way is clear. We should have an encouraging journey.

The territory of this Fascicle is intended to be that of the genus Sabal, but much of this geography is unexplored for these palms. For the first time the palmettoes of British Honduras are described, three of them, yet this presentation is probably not complete nor are we certain that we understand the three. The one species described from Guatemala is really not yet identified, and I have seen flowers of what appears to be another species in that country. In El Salvador Standley and Calderón speak of a native hat palm of this genus but the species is not identified: Lista Preliminar de las Plantas de El Salvador, 42 (1925). The hat palm of Costa Rica is supposed to have been introduced, but its identity is not established. I am informed, however, that native stands of a fan palm supposed to be Sabal occur on the Osa peninsula, near Pacific Panama. The only Sabal so far recognized from Panama, *S. Allenii*, from one of the Perlas Islands on the Pacific side, was founded as late as August 1943. I have seen sterile material of a native Sabal from the Pacific area of the mainland of Panama, yet undetermined. The whole continental territory from Mexico to Colombia needs careful exploration for palmettoes.

Many specimens in my collection from outlying places are yet unidentified, mostly for lack of fruit. I do not care to undertake determination of Sabals outside the usual ranges unless I have mature fruits from the same tree as the other material; and I do not found a new species in Sabal when these parts are lacking.

Genera intended in this Fascicle are Sabal and Serenoa, both confined to the western hemisphere. The word *palmetto* comes ultimately as a diminu-

tive from Latin *palma;* it has been applied to the dwarf *Chamærops humilis* of the eastern Mediterranean region, but in general usage now denotes particularly the American species. In the plural the word may take the spelling *-os* or *-oes*, either form being allowed by the Webster Unabridged Dictionary and the New Century; I prefer the second usage, to correspond with the American words *potatoes* and *tomatoes*, even though of very different origin. What we like to call the tree palmettoes in this country are the species of Sabal. In this genus was also included the saw palmetto, distinguished by the petioles usually bearing spiny serratures, until separated by J. D. Hooker in 1883 as Serenoa; we recognize only one species, *Serenoa repens*, native to the southeastern United States.

In 1935 H. H. Bartlett raised the question whether Serenoa is separable from Acœlorraphe, Wendland 1879, finding "no distinction of generic importance" between the two: Botany of the Maya area, Publication 461, Carnegie Institute. He had doubts, however, about the standing of Acœlorraphe as a generic name, and suggested that if the name cannot hold then the species be transferred to Serenoa. I later examined these possibilities and came to the conclusion that the name Acœlorraphe is not tenable under the Rules but that the genus is botanically distinct from Serenoa (Gent. Herb. iv, 361, 1940). I then took up the name Paurotis, Cook (1902) for Acœlorraphe and retained Serenoa for the saw palmetto of the United States. What is to be done with the Mexican and Central American species described under Acœlorraphe is a subject for separate study (see Gent. Herb. vi, 178–9, 1943).

Drawings for illustrations in this Fascicle are the work of Florence Mekeel, except numbers 191, 192, 195, 199, 238, borrowed from previous Fascicles in this series. Photographs for the half-tones are by the author, with the following exceptions: Fig. 189 by Professor Erdman West of the Florida Experiment Station at Gainesville; 219 by Paul H. Allen; 226 by M. Adrien Questel; 239, Missouri Botanical Garden; 244, 248 by L. Irby Davis, Harlingen, Texas; to all of these collaborators and to others who have loaned me specimens I express my earnest appreciation. I have had free use, now and in the past, of collections in the National Herbarium, Washington, New York Botanical Garden, Gray Herbarium, collections of the Chicago (Field) Museum, University of Michigan.

Specimens of palmetto

It is difficult to make out palmetto botany from the usual herbarium and museum material. Some of the deficiencies in such collections were explained and illustrated in my paper on Palms and their Characteristics of 1933 (Gent. Herb. iii, fasc. i).

The primary obligation in any collecting of herbarium specimens is

that the material shall represent the plant to the end that one may determine the kinds. Very little of the palm material in the herbaria meets this simple requirement. It is apparently the purpose of the usual collector to make specimens that will occupy as little space as possible; when this is the dominating effort, the collector would better let the palms alone.

The big fan-shaped leaf of a palmetto cannot be represented by a fragment. At least one-half the leaf should be preserved, cut lengthwise into pieces, and folded, so that when they are later assembled the leaf is reconstructed before the observer. The entire midrib should be preserved with the pieces. Certain segments of the leaf may run into long slender attenuate points, and others on the same leaf may have short and broad points; these differences might lead the observer of herbarium material to refer the specimens to different species if he did not know their connection. One piece of a palmetto leaf is of little service.

The entire petiole should be preserved. If it is 10 feet long, then the obligation to take all of it is decidedly the greater. The petiole is cut into lengths not exceeding 15 inches, so that the pieces may be filed in boxes or trays in an herbarium pigeon-hole. The hastula should always be preserved intact; and if the specimen is mounted the piece should be placed face up so that the hastula may be seen; many of the specimens that I am obliged to examine are mounted face down. The hastula is a much more important character for diagnosis than the midrib on the back.

In fact, however, these heavy palm specimens should not be mounted. Fig. 16 of my quoted Fascicle (i in Vol. iii) shows how they may be kept in folders of mounting paper, each piece with its own tag; the specimens may then be unfolded on the table and both surfaces are available for examination.

It goes without saying that flowers and fruits should come from the same plant as the leaves, and so stated on the labels, otherwise the student may not know whether he is dealing with one species or with two or three.

Good photographs of trees are essential. Usually the results of snapshots are not satisfactory. A good tripod camera is the proper equipment, with careful focussing and time exposure for detail. Development is preferably by hand, to bring out the details; a contrasty negative is not desired, for botanical work; one ought to show the structure of the parts rather than to make a "picture" of high lights and strong shadows. In making prints one should be careful not to use the wrong paper whereby the details are blacked-in and obscured or lost. I always develop my own exposures in travelling and I use only cut films or film-packs. A good photograph ought to show the length of flower-clusters in reference to the foliage, for this is an important character in species of palms, particularly in palmettoes.

Care and deliberation in the making of palm specimens soon lead the collector to discover differences between species, until finally he is able to see a palm when he looks at it.

The leaf form in Sabal

Two leaf forms are in the Sabals. One of them is essentially palmate, with the petiole not projecting far into the blade, which is flat, and the hastula is short and rounded. This form is characteristic of *Sabal minor*, which is the generic type, being the plant on which the first description and first species were based. Such leaves are seen in Figs. 198, 199, 200, 201.

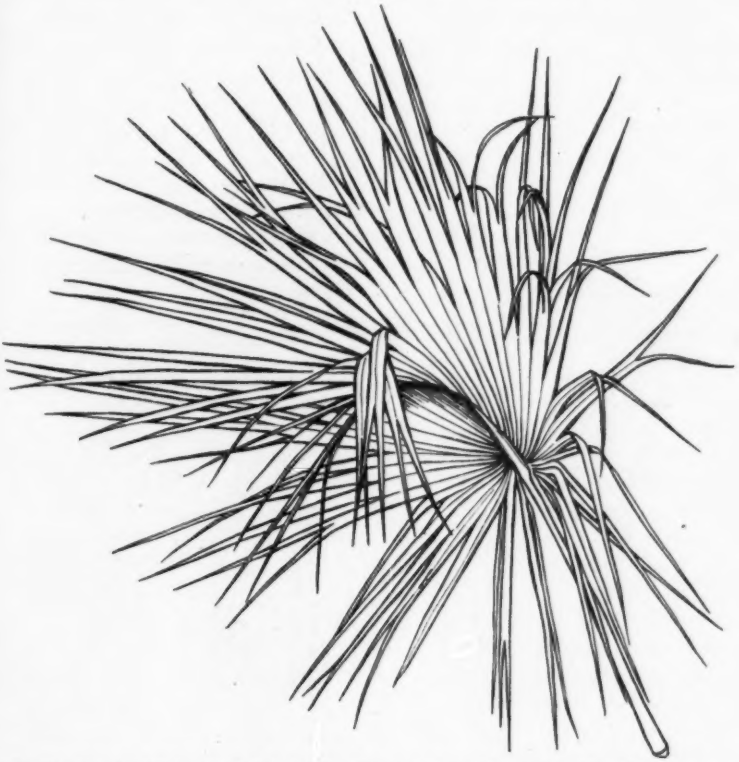
The other form has the petiole projected far into the blade or even nearly the length of it, in the form of a midrib that is prominent on the under side of the leaf, and the hastula (ligule) is usually a long acuminate body; the rib or costa is downwardly curved as the leaf stands on the tree (Fig. 187), and the blade is divided part way to it, whatever undivided part may remain being called the palman. This midrib structure gives the leaf a strong curve when seen sidewise, quite unlike that in other fan palms although seen to some extent in certain species of Livistona: this form of Sabal leaf is said to be costapalmate.

The palman in flabellate palm leaves is the undivided part of the blade. When the laciniations are very deep, the palman is correspondingly shortened and the costapalmate form is more or less obscured. Unfortunately, herbarium specimens are infrequently so taken as to expose these fundamental differences. Compare Figs. 187 and 188.

In 1901 Dr. O. F. Cook made these distinctions the bases for two genera, the palmate leaf marking Sabal and the costapalmate characterizing a new genus, Inodes. The palmate leaf is that of the acaulescent *Sabal minor*, and supposedly also of *S. mexicana* which was compared by Martius with *S. minor* in botanical features and of the recent species *S. Deeringiana* for which the earlier name *louisiana* was later revived. The species of Inodes are usually trees, some of them as much as 100 feet tall. The name *S. louisiana* designates the dwarf palmetto with a trunk, and these arboreous forms have leaves intermediate in structure between Sabal and Inodes, with no other differences except sizes of parts associated with stature: therefore in my Sabal paper of 1934 I united Sabal and Inodes, following the example of Beccari in 1907 and of Small in 1933.

It is now apparent to me that the *louisiana* (*Deeringiana*) palmetto is only an emergent or final stage of the species known to us as *Sabal minor* and that so far as nomenclature is concerned it cannot be kept separate, although the reasons for its appearance now and then are yet to be determined. I wonder whether we may not approach the problem from the other end by supposing that in the long processes of evolution the ordinary

acaulescent *S. minor* is a phenomenon of arrested development, not having attained its maximum. We are then confronted with the problem of determining the biological or phylogenetic reasons for this arrest. If all the other Sabals are costapalmate and caulescent (except *S. Etonia* in its usual state) and all of them go through the palmate stage in their acaulescent youth, we may be allowed to speculate whether *S. minor* may not have ceased its development and have prematurely acquired its fruiting habit in its juvenile state, or, perhaps, we may have a case of retrogressive evolution; and perhaps the reasons for this performance are not apparent in the natural circumstances and conditions under which the plant grows in our geophysical epoch. Perhaps, also, our philosophy is too much limited by the perspectives and practices of the present day to enable us to apprehend.



187. COSTAPALMATE LEAF of *Sabal Palmetto*, seen from the under side. Note the continuing rachis and downward curve of the blade, and extensive palman or undivided part.

There is a good example of arrested palmate leaf in the plant described as *Sabal Jamesiana*. From the original or type tree of that supposed species we have costapalmate leaves a few years later (see page 434).

Caudex behavior in the palmettoes

In my palmetto monograph (Gent. Herb. iii, fasc. vi) I called attention to the peculiar trunk system and in Fig. 146 (our present Fig. 192) showed the subterranean part of the plant. It is curious the way the trunk points downward following germination, as seen at the left in Fig. 192 and then takes an upward direction, sometimes, as in the central specimen, never reaching the surface of the ground. At the right, the primary downward part remains in the leftward woody projection at the base. It now remains to examine the origin of these unexplained structures.

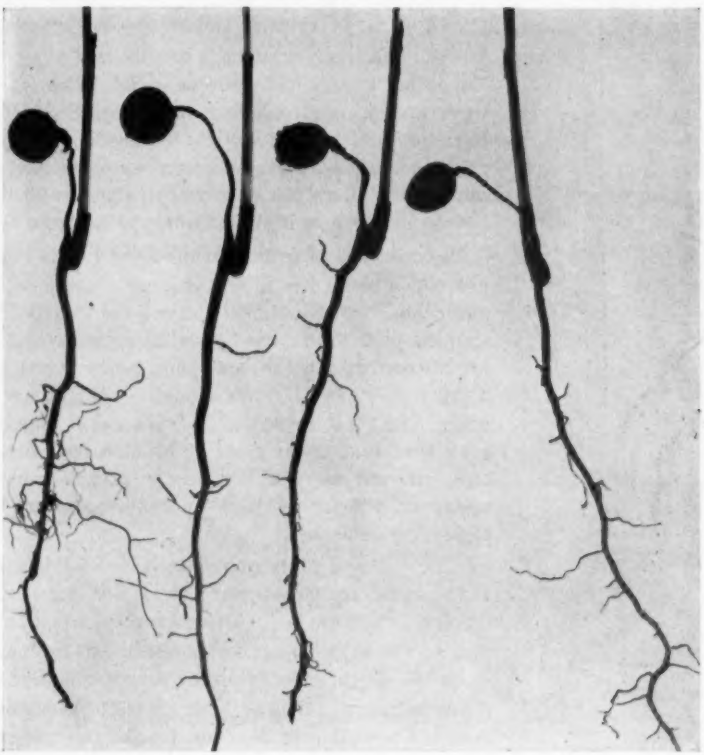
We begin with germination. Base of the cotyledon elongates in germination, sometimes making a root-like projection or "rope" (*chorda germinalis*) from the seed, often several inches long; this extension passes into the ground, and bears at its tip the radicle and plumule, which then as they grow take a downward and upward direction respectively, as seen in Fig. 189. Roots may form along the lower part of the up-growing caudex or stem;

188. SIDE VIEW OF LEAF of *Sabal mauritiæformis*. The leaf is deeply cut so that little palman remains, each segment hanging independently.

this stem where it turns upward forms an obtuse knob-like or bulb-like end, as explained on page 280 of the first Sabal paper, and shown clearly in Fig. 192 as well as in Fig. 189. This mode of germination apparently runs through the Palm family in various modifications and has been observed for more than one hundred years. It is shown for one of the latan palms in Fig. 36, Gentes Herbarum, vi, page 63 (1942).

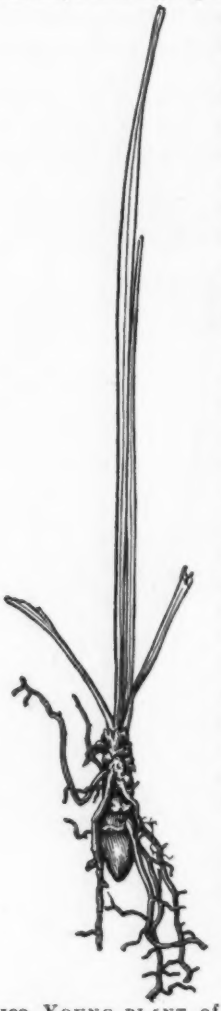
The pictures herewith (189, 190) illustrate some of the stages in the germination in Sabal. These explanations are made not as a study in germination but only to indicate in part the subsequent caudex system of the particular species.

It is not known why some species of palmetto hold the caudex below ground and others elevate it toward the sky. These habits are not as in-



189. GERMINATION of *Sabal Palmetto*, showing the germinal chord or "rope" extending rightward from seed, from the lower end of which rises a caudex and descends a root.

flexible and invariable as commonly supposed, however. One sees flatlands covered for hundreds of miles with saw palmetto with no visible trunks; if one digs up a clump of them many horizontal trunks or caudices are found, more or less branched (Fig. 191); now and then a sand dune partially covered with them blows away and exposes bent and shapeless trunks that had never emerged. Sometimes, however, one comes on a colony, commonly in densely covered boggy land, in which the trunks rise straight and rigid to 10 or 15 feet, and for which the observer finds no satisfactory explanation. It is strange that these arboreal forms have never received Latin names as species, or at least as varieties; apparently they do not represent taxonomic units.



190. YOUNG PLANT of *Sabal minor*, showing the knob at base where the caudex ascended. ×½.

Another unexpected example is *Sabal Etonia*, always known as an acaulescent palm; yet in this Fascicle one learns of straight strong trunks (Fig. 203) that rise to 8 feet; such trunks may be seen in some of the plants in a colony of *S. Etonia* near the Oklawaha River in Marion County, Florida.

Historic case of fruitful acaulescent plants in an aboreous species lies in the original account of *S. mexicana*, 1838. Karwinski had collected seeds of a stemless palm in the wild Chacahua region in southern Mexico; he saw the same palm farther south by Tehuantepec, in all ways similar except that it grew 20 feet tall. From the Chacahua seed Martius grew the plant under glass at Munich but apparently did not carry it beyond the juvenile virgin state; see account of species number 26, near the close of this Fascicle.

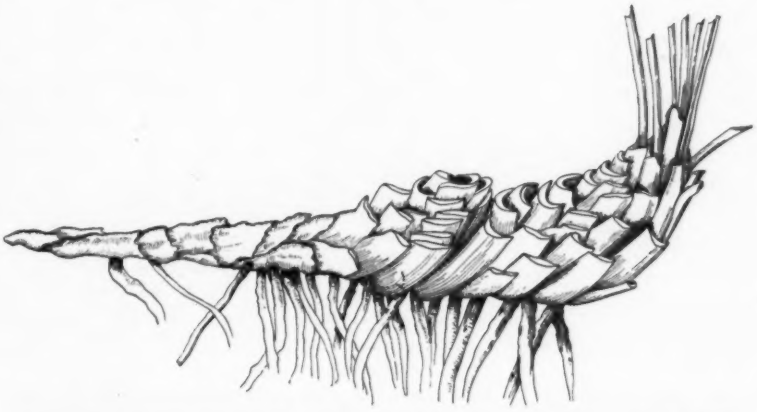
The common cabbage palmetto, *Sabal Palmetto*, shows significant variation in trunks. Sometimes the trunks are mature enough to be fruitful when only 1 or 2 feet tall or even not apparent to the ordinary observer; at other times they are very slender and of different aspect, rising to 80 or 90 feet, for reasons that one is unable to discover. One of the reasons why John K. Small at first separated and named his *Sabal Jamesiana* was the very short trunk,

perhaps only 2 or 3 feet high; his original tree had grown taller when I visited it some years later.

One may note, also, the trunk contrasts in Figs. 247 and 248 (both of which may be fructiferous), representing *Sabal mexicana*.

The most publicized of these trunk variations is the Louisiana palm called *Sabal Deeringiana* by Small and *S. louisiana* by Bomhard, due to the fact that it has received a specific name because it has a caudex. There is probably nothing stranger in this case than in the others, and there are no uniform definable botanical characters to separate the plant from the so-called acaulescent range of *S. minor*. All old plants of *S. minor* have trunks that end just beneath the surface of the ground. I have now seen much of this species from the Atlantic seaboard to the Edwards Plateau in Texas and I think it all one species, variable not alone in caudex but in branching of inflorescence, width and color of leaf-segments, leaf filaments, size and surface of fruit. I have seen emergent trunks of it far to the east of Louisiana and Texas.

There has been much speculation as to the reason for the emergent trunks of the Louisiana palmetto. It has been suggested that the reasons lie in the chromosome behavior. This suggestion is easy to make. All kinds of changes in terrain have been adduced to account for the phenomenon, not one of which has been even an approximate explanation in the colonies I have seen. I do not speculate. We must wait, as we wait for the Oklawaha colony of *Sabal Etonia*. Perhaps the explanation lies much farther back than we think. I am impressed by the remark of Dr. Miriam L. Bomhard in her last interesting and valuable paper on the Louisiana palm (Journ.



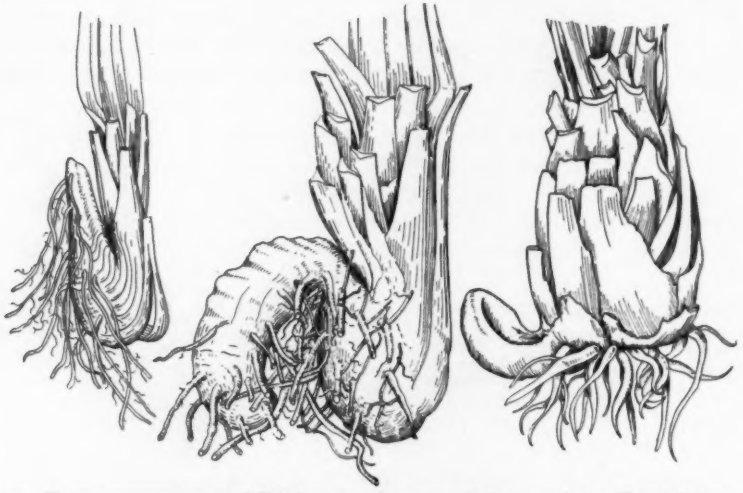
191. UNDERGROUND SYSTEM of *Serenoa repens*, in dry sands; southern Florida. ×⅛.

Wash. Acad. Sci. xxxiii) that an ancient tree of this palm "may well be 200 or more years of age." What may have occurred in two hundred years may not be discovered by present observation, or whether the emergent trees may be singularly older than the others. Her careful record of places and physical conditions may one day have much significance.

Campestral studies

We are confronted in the palmettoes with a novel problem in taxonomy; and undoubtedly we shall find comparable uncharted realms in other kinds of plants.

These emergent trunks, if I interpret them correctly, do not constitute botanical varieties or formæ or any of the other subspecific categories with which we divert ourselves. Their significance is not explained or even elucidated by the usual botanical collecting. The mysteries behind them probably will not yield to the laboratory investigations now so ardently and usefully pursued. Hybridization, at present so much in fashion, cannot resolve them, for at the outset we need clarity rather than confusion. Ecology as now mainly practiced is not a hopeful approach, because the first requisite is to know the species. The study of distribution and of plant populations, as we presently understand that delightful exercise, might not uncover the reasons.



192. UNDERGROUND PARTS of *Sabal minor*, about one-sixth natural size. Two left from the wild, first one not yet in bearing age, middle plant fruiting. Right-hand specimen a transplanted nursery subject in full bearing age.

The field itself is the laboratory. Conditions extending over generations and centuries are investigable nowhere else. Removal of the plants to places "under control" and therefore of different character would break the continuity and the resulting "behavior" studies would not avail. The natural out-of-doors as a laboratory rather than as a collecting ground is a concept we must develop if we are ever to understand many of the reasons for the forms of life, and to which, as the studies develop, all the other aids may be added. I am convinced that we need to approach some of the problems connected with the identification and diagnosis of the palmettoes by methods not yet formulated.

It is time that some of us again become naturalists.

Variation in palmettoes

The old methods of collecting these plants, often heavy big and intractable, whereby we take fragments that mean practically nothing, cannot disclose the fact that they are perplexingly diverse. If we are willing to collect a single plant thoroughly we are convinced that nothing further is required; yet a single plant does not exhibit variation.

We pass the astonishing differences in height between trees or stands of palmettoes with little thought of their significance. We acquire concept of a species from a single group or even a single tree, or from an "original" description based on such an experience, and the idea becomes stabilized.

If you are fortunate enough to search for *Sabal Palmetto* from Smith's Island off the southern mainland of North Carolina to Cudjoe Key near Key West and westward to its limits on the mainland of Florida, you will unavoidably note differences in statures and sizes; if you are attentive you will also see singularities in size and hang and laciniation of leaves, in length of flower-clusters in relation to leaves and in the branching of them, in size and profuseness of flowers, and be astonished with the different sizes of fruits. If some of these variables were found in places remote from the territory of *S. Palmetto* we probably would think them to be other species. In fact, two such supposed species already have been described, *Sabal Swartzii* and *S. Jamesiana*.

193. NODIFRONDS on a young flowering axis of Sabal, ×¼. From each sheath of a nodifrond a flower-cluster may emerge, and the leaf-like end becomes prominent.

Let the reader note what he may think to be discrepancies in the pictures in this Fascicle in trees and fruits of *Serenoa repens*, *Sabal minor*, *S. Etonia*, *S. jamaicensis*, *S. Palmetto*, *S. umbraculifera*, *S. mexicana;* and probably any of the other species would yield similar ranges if they were as extensively observed. He may note the remarks on leaves and caudices of palmettoes in the preceding pages.

In my experience I have been aware that collectors think palms are palms; but they are as interestingly variable as many kinds of more familiar plants.

Literature

Four general treatments of Sabal have appeared within the present century:

COOK, O. F. Bulletin of the Torrey Botanical Club, xxviii, 529–534. October, 1901.

BECCARI, EDOARDO. Webbia, ii, 10–86. Florence, 1907.

——— ——— Annals of the Royal Botanic Garden, Calcutta, xiii, 287–298, and accompanying plates, 1931.

BAILEY, L. H. Gentes Herbarum, iii, 273–339 (fasc. vi), Ithaca, New York, December 1934. Out of print.

PHYTOGRAPHY

For present purposes the name palmetto may be restricted to two genera, Serenoa and Sabal, both of which are exclusively American.

I. Fruit oblong or at least longer than broad, pulpy, drying into shrivelled bodies 2–3 cm. long (Fig. 196); seed oblong, often pointed at both ends, raphal scar extending length of it, micropyle dorsal near one end: nodifronds with broad ends that are blunt or bear only a very short wide point: leaf-blade palmate, without midrib, the short hastula showing on both surfaces; petiole spiny-serrate (with partial exceptions now and then) ..... 1. SERENOA

II. Fruit globular to short-pyriform, rounded, 3 cm. or less in transverse diameter, the pulp scant or contained within a papery shell that more or less holds its shape in drying; seed circular as viewed from top or bottom, depressed, rounded on top, flattened or concave on lower or basal face, contained in either a thin or substantial mesocarp, micropyle lateral, sublateral or superlateral (Figs. 223, 238, 240): nodifronds terminating in narrow-acute or acuminate tips: leaf-blade costapalmate but in many species the palman very short, hastula on upper surface only; petiole always unarmed ..... 2. SABAL

1. **SERENOA,** J. D. Hooker, in Benth. & Hook. Gen. Pl. iii, 926 as Serenæa, corrected to Serenoa, 1228 (1883). SAW PALMETTO.

Low palms, trunks or rhizomes usually subterranean but sometimes emergent to 1–3 m. or more, bearing true palmate leaves without prominent hastulas: flowers hermaphrodite, with tubular 3-lobed calyx and 3 more or less separate petals, stamens 6, anthers versatile, pistil of 3 carpels only one of which commonly matures: seed single in each carpel. Species 1, in southeastern United States. Dedicated to Sereno Watson, 1826–1892, associate with Asa Gray, well known North American taxonomist.

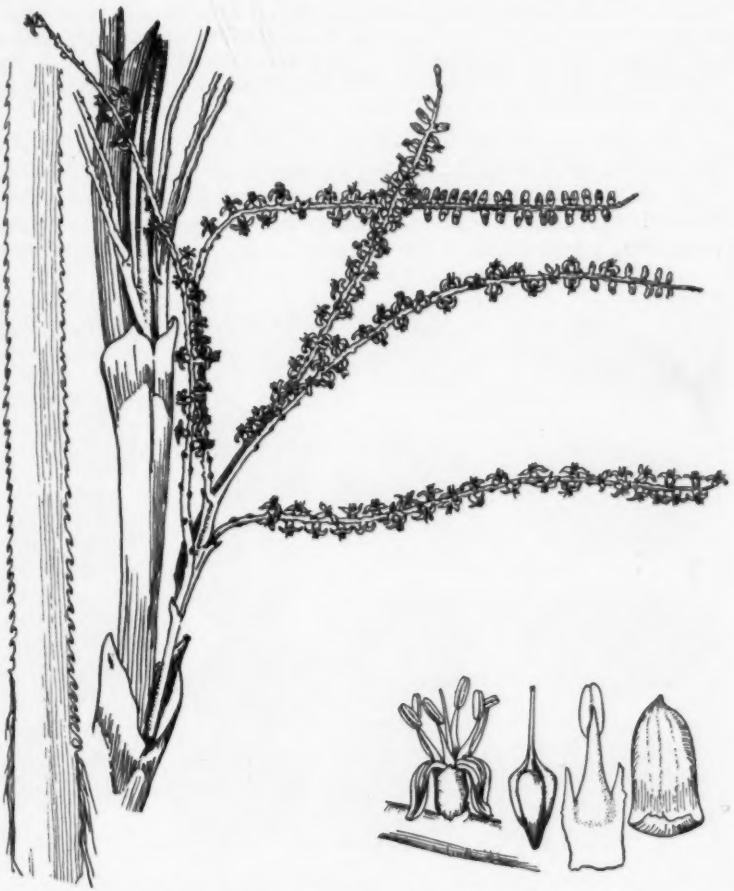
Serenoa repens, Small, in Journ. N. Y. Bot. Gard. xxvii, 197 (1926). Figs. 191, 194, 195, 196.

Corypha repens and *C. obliqua,* Wm. Bartram, Travels, 61 (1791).
Chamærops serrulata, Michx. Fl. Bor.-Amer. i, 239 (1803).
Sabal serrulata, Schultes & Schultes, Syst. Veg. vii, 1486 (1830).
Brahea serrulata, Wendl. in Kerchove, Palmiers, 235 (1878).
Serenoa serrulata, Nichols. Ill. Dict. Gard. iii, 423 (1887).

Commonly acaulescent, gregarious, forming extensive dense colonies, caudex usually horizontal (Fig. 191) and shallowly subterranean but sometimes erect or oblique to 6 or 7 m. and the plant then arboreous with a slender rough trunk, frequently the caudices making conspicuous branching exposed tangles in boggy places: leaves palmate without continuing costa or rib, green, yellowish-green or glaucous, orbicular in outline, flat, 1 m. or less across, palman comprising one-fourth to one-third or more length of the blade; petiole usually slender, connecting at expanding base with extensive brown web or fabric, often much exceeding the blade in length, convex on under face and nearly or quite plane above, thin margins closely spiny-toothed although in exceptional cases the teeth may be nearly or quite wanting, hastula a membranous short almost scale-like structure showing on both faces of the base of the blade; segments 9–12 on either side, mostly firm and stiff but infrequently loosely hanging, midnerve prominent and often a conspicuous secondary nerve either side and several tertiary veins, 3 cm. or less broad at base, split 6–20 cm. or more at apex into narrow pointed lobes: inflorescences usually not exceeding the leaves, comprising a reddish-brown main axis less than 1 m. long which bears loose sheaths with 2 broad muticous or only very short-pointed sheaths, side-clusters many and mostly once-branched, the pubescent rachillæ profusely flowered and strongly divaricate or drooping: flowers (Fig. 195) nearly or quite sessile, 5–6 mm. long, short-toothed calyx tubular-terete, petals exceeding calyx and reflexed in anthesis and bearing calluses on the inner face, filaments broadened, anthers prominent: fruit (Fig. 196) variable in size and shape, drupe-like with prominent mesocarp, oblong to more or less pyriform, 16–25 mm. long and 12–15 mm. thick, black or bluish, edible and likely to be taken by animals; seed contained in an inner shell, oblong with shortly narrowed ends, 18 mm. or less long and about one-half as thick, light brown, glabrous and dull, lengthwise raphal scar prominent, micropyle depressed-circular as in Sabal, located on back or top past the middle, or near one end.

194. Serenoa repens, the usual acaulescent phasis; southern Florida; now in bloom. Saw palmetto.

Coastal Plains region from lower South Carolina to the Florida Keys, westward to southeastern Mississippi, in many soils and natural conditions, forming dense low ground-cover over hundreds of miles, in both wet and dry woods, on both sandy and stiff lands, pine barrens, swamps and hammocks, the most abundant palm within its territory. Assignments of this palm to southeastern Virginia, North Carolina and to Texas are apparently erroneous. Type locality, Saint Simon Island, Georgia, *W. Bartram.*

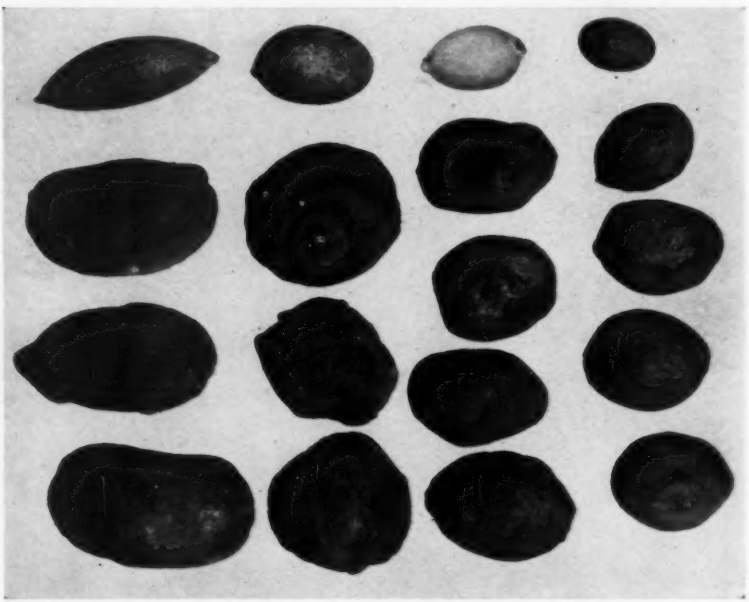


195. DETAILS OF SAW PALMETTO, *Serenoa repens.* Piece of petiole at left. Side-cluster of flowers ×¾. Flower ×3. Pistil, stamen, petal ×5. Stamens are connate at base, indicated in the lower cut by the prongs of side tissue torn away.

2. **SABAL,** Adanson, Fam. Plant, ii, 495 (1763); Guersent, in Obs. sur le Sabal d'Adanson, Bull. no. 87 des Sci., Soc. Philomathique, Paris, 205, t. xxv (1804). Palmetto.

Acaulescent or arboreal palms, bearing costapalmate leaves although the palman is very short in some species and the midrib perhaps not extending the length of blade, hastula well developed on upper face of blade, petioles not spiny-toothed: flowers hermaphrodite, with tubular or cupulate 3-toothed calyx, 3 petals usually separate, stamens 6, pistil of 3 carpels, only one of which commonly develops. Species 26 as here defined, others known to exist but not well enough understood to warrant description, southeastern North Carolina to Florida and through the West Indies, westward to eastern Texas and south to Colombia. Generic name unexplained by either Adanson or Guersent.

The original designation of the genus Sabal by Adanson in Familles des Plantes, 1763, is not full enough to meet the requirements of current Rules of Nomenclature, yet it is explicit in calling the plant Palma Caroliniana H.R.P. (Hortus regius parisiensis) and swamp palmetto in English vernacular, together with a few botanical characters; the account is as



196. Serenoa repens, saw palmetto. Variable fruits in the dry state, natural size; row of nutlets or seeds across the top. Each column is a single collection.

good as that of many other early genera now admitted, and Adanson left a good specimen so that identification is established. Those who oppose Adanson generic publications as insufficient may date Sabal from Guersent, 1804, who, however, attributed the name to Adanson.

Sabals are much planted in tropical and subtropical regions. Most of them are strong growers and thrive under diverse conditions. Trunks are used for posts and leaves for thatch. Leaves are employed extensively in the making of hats, and in Latin America the species are called indiscriminately Palma de sombrero. The "hat palm" from which Panama hats are made, however, is not a palm; it is *Carludovica palmata* of the Cyclanthaceæ.

Key to the species of Sabal

Measurements of leaf-blades, segments, palmans, petioles, hastulas are taken from mature leaves on trees of bearing age, not from leaves on young trees or from juvenile growth. The student may not be able to use the Key with the prevailing specimens in the herbaria, which, I regret, are not sufficient.

A few terms may aid in the understanding of the key and descriptions:

Coma (Latin, head of hair). A term long in use for the leafy crown or head of palms, applied particularly to tall tree-like species.

Costapalmate. Leaf of the palmate kind in which the midrib is continued far into the blade and sometimes runs the length of it, the blade usually curved downward; Fig. 187.—*Bailey, Gent. Herb. iii, 285 (1934).*

Hastula (Latin, little spear). The ligule at apex of petiole of palmate and costapalmate leaves, on upper side at base of leaf-blade.—*Bailey, Gent. Herb. iii, 16 (1933).*

Nodifrond. The spathelet or sheath and its extended blade in Sabal attending a flower-branch at the node of an inflorescence (Fig. 193).—*Bailey, Gent. Herb. vi, 264 (1943).*

Palman. The undivided base or part of a leaf-blade in palmate and costapalmate leaves (Figs. 187, 188).—*Bailey, Gent. Herb. iii, 286 (1934).*

Rachilla. Ultimate branch or branchlet of a compound spadix or inflorescence, on which the flowers and fruits are borne; term long used in descriptive botany, here applied particularly in the Palmaceæ.

I. Subgenus Eusabal, Small, in Man. Southeast. Fl. 239 (1933). Hastula obtuse and very short, under 6 cm. long: leaf-blade commonly flat or nearly so and essentially palmate, the costa or rib (if any) weak and only 2–4 dm. long and not constituting a continuing structural axis, blade tending to split or divide into two parts with age: inflorescences erect and normally overtopping leaves although eventually curving or arching with weight, the side branches usually nearly or quite simple, the cluster small and compact: plant commonly acaulescent but sometimes with emergent short trunk. Southern United States, North Carolina to Florida and west to Texas ..... 1. *S. minor*

II. Subgenus Inodes, Small, l.c. (Genus *Inodes*, O. F. Cook, in Bull. Torr. Bot. Club, xxviii, 529, 1901). Hastula acute and variously acuminate, often much elongated: leaf-blade costapalmate (bearing a long-continued strong costa or rib from which the successive segments arise but neither flabellate or pinnate,

arched downward in a characteristic curve): inflorescences horizontal or soon becoming so or drooping with weight. North Carolina to Colombia.

A. Hastula very small and narrow or sharp-pointed, usually not exceeding 2–3 cm. long.

B. Leaves very filiferous; segments with narrow sometimes thread-like ends; apex of hastula flat on the rachis and not evenly triangular: plant commonly acaulescent yet rarely with emergent bole, the subterranean part tortuous and usually curved on itself at maturity. Peninsular Florida ..... 2. *S. Etonia*

BB. Leaves usually not filiferous or only indifferently so and segments not produced into thread-like ends; apex of sharply triangular hastula raised above the rachis like the bow of a boat: plant with trunk 3–4 m. high. British Honduras ..... 3. *S. mayarum*

AA. Hastula elongate or at least broad and large, 4–5 cm. and more long: plant caulescent, tree of differing dimensions.

B. Palman (the undivided basal part of leaf-blade) very short or sometimes practically none due to the deep laciniation, sometimes 12–25 cm. long at the middle, the leaf with an open divided look: fruit small, usually under 13 mm. diameter when mature and dry.

C. Under surface of leaves decidedly glaucous; hastula long-acuminate, 3–5 cm. long: inflorescences extending far beyond leaf-head: fruit short-pyriform, 8–12 mm. broad. Trinidad, British West Indies. ..... 4. *S. glaucescens*

CC. Under surface of leaf not glaucous, although perhaps light colored (silvery in No. 9).

D. Rachillæ (of flower-clusters) stout, not filiform, more than 1 mm. thick when dry.

E. Fruit tapering to stout prominent base (or stalk) that bears reflexed remains of floral envelopes: leaf-segments conspicuously drooping midway; hastula very broad, hardly acuminate but abruptly acute. Cultivated ..... 5. *S. peregrina*

EE. Fruit not tapering to a dominating thick base: hastula long-acuminate.

F. Leaf-segments not much lighter colored on lower than on upper surface: tree of ordinary dimensions.

G. Width of segments 3 cm. or less (usually about 2 cm.); filaments prominent in sinuses. Cultivated ..... 6. *S. viatoris*

GG. Width of segments 4 cm. or more; filaments very few or none in sinuses.

H. Segments strongly ribbed or costate lengthwise because of the upstanding midribs, extending into very long narrow usually filiform ends. Colombia ..... 7. *S. mauritiæformis*

HH. Segments plane, not strongly ribbed, not extended into fine or filiform ends. Cuba ..... 8. *S. Yapa*

FF. Leaf-segments silvery underneath although not glaucous, with filiform ends: tree excessively tall and slender. Guatemala, British Honduras ..... 9. *S. Morrisiana*

DD. Rachillæ very thin, 1 mm. or less thick when dry, the ends almost filiform.

E. Fruit scarcely pyriform: tree excessively tall, very slender. British Honduras ..... 10. *S. nematoclada*

EE. Fruit tapered to base and more or less pyriform: tree of ordinary dimensions. Panama ..... 11. *S. Allenii*

BB. Palman comprising one-fourth or one-third or more length of leaf-blade, in mature leaves from trees of bearing age (i.e., blade not divided on all sides nearly to the hastula): fruits small or large.

CC. Palmettoes with small fruits, globular or nearly so, 13 mm. or less in transverse diameter when mature and dry.

D. Length of hastula 8–9 cm. or less and usually not very long-acuminate; leaves sparingly or not at all filiferous.

E. Mature dry fruits 10 mm. or less diameter; infructescences mostly shorter than leaves: segments not rigid in texture. Bahamas ..... 12. *S. bahamensis*

EE. Mature dry fruits 12–13 mm. diameter; infructescences much exceeding leaves: segments very stiff or rigid in texture. Yucatan peninsula ..... 13. *S. yucatanica*

DD. Length of hastula 10 cm. or more, long- or slenderly acuminate: inflorescences mostly equalling or exceeding the leaves: fruits asymmetrical or short-pyriform.

E. Leaves with few or no filaments in sinuses; hastula 20 or more cm long. Jamaica ..... 14. *S. jamaicensis*

EE. Leaves usually abundantly filiferous.

F. Fruit tapering to base or short-pyriform.

G. Length of hastula 25–30 cm.: rachillæ terete or essentially so when dry: leaves very light colored underneath. St. Bartholomew, introduced (Turks Island?) ..... 15. *S. Questeliana*

GG. Length of hastula seldom exceeding 12–15 cm.: rachillæ sharply cornered when dry: certain trees or colonies with glaucous leaves. Puerto Rico ..... 16. *S. causiarum*

FF. Fruit not pyriform even though sometimes lop-sided: leaves not glaucous.

G. Rachillæ (in flower-clusters) terete when dry: leaf-segments often or usually developed to very thin or even thread-like long ends: inflorescences seldom if ever exceeding the leaves. Cuba ..... 17. *S. parviflora*

GG. Rachillæ thin, not terete but angled or irregular when dry: leaf-segments seldom with thread-like very slender ends: inflorescences conspicuously exceeding leaves. North Carolina to Florida ..... 18. *S. Palmetto*

CC. Palmettoes with large fruits, 15 cm. or more in transverse diameter when mature and dry (or when fresh in No. 21).

D. Mature fruit distinctly pyriform (tapered to base).

E. Axis of dry rachillæ about 1 mm. (or less than 2 mm.) thick, closely or compactly fruited: fruit mostly 15 cm. broad, regular in shape. Cultivated ..... 19. *S. Beccariana*

EE. Axis of dry rachillæ 2 mm. thick and loosely or sparsely fruited: fruit mostly 16 or 17 mm. thick, usually irregular in shape. Bermuda ..... 20. *S. bermudana*

DD. Mature fruit globular or somewhat flattened, not pyriform.

E. Inflorescences much shorter than the leaves, usually shorter than the petioles: fruit mostly oblate when fully developed.

F. Size of developed fruit about 20 mm. in transverse diameter, but variable. Hispaniola; much planted ..... 21. *S. umbraculifera*

FF. Size of fruit 27 mm. diameter. Planted in Mexico .. 22. *S. Dugesii*

EE. Inflorescences equalling or exceeding the leaves.

F. Foliage prominently glaucous-blue; hastula long and very narrow, 13–15 cm.: fruit about 20 mm. diameter. Northwestern Mexico ..... 23. *S. uresana*

FF. Foliage green.

G. Length of hastula short, about 5 cm.: fruit nearly or

quite spherical, about 18 mm. diameter: leaves noticeably downward-curved. Northwestern Mexico . . 24. *S. Rosei*

GG. Length of hastula 12–20 cm., very narrow and acuminate.

H. Seed 10–11 mm. across; mesocarp thick and grumose; fruit at full growth 20–22 mm. across: flowers opening flat, with stamen lying on each petal: leaf-segments with narrow but usually not filiform hanging ends: tree at full growth with stiff heavy usually straight trunk (unless when modified by unusual placement or circumstances). Along lower Rio Grande on Texas and Tamaulipan sides . . . . . 25. *S. texana*

HH. Seed about 9 mm. across; mesocarp thin; fruit 18–20 mm. across: flowers with erect or spreading not horizontal petals and upstanding stamens: leaf-segments with long-filiform ends: usually a slender tree in groves and woods conditions, the trunk often not straight or rigid. Northern Mexico (central Tamaulipas and Nuevo Leon to Guatemala) . . . . . 26. *S. mexicana*

Listing of the Sabals on prevailing sizes and shapes of mature dry fruits. Figures are mm., in transverse diameter.

Very small, 9 mm. or less.
S. viatoris, globular.

Medium small, 10 mm. or less.
S. nematoclada, 8–10, globular; *S. Allenii*, 8–10, tapering; *S. Morrisiana*, 9–10, somewhat tapering; *S. bahamensis*, 9–10, globular.

Upper small, 13 mm. or less.
S. minor, 8–13, globular; *S. glaucescens*, 8–12, pyriform; *S. Yapa*, 9–11, pyriform; *S. parviflora*, 9–13 and more, little if at all tapering; *S. Palmetto*, 9–12, infrequently less than 10, globular; *S. peregrina*, 10–12, somewhat tapering, with long base; *S. mauritiæformis*, 10–11, globular or nearly so; *S. Questeliana*, 10–12, tapering; *S. causiarum*, 10–13, tapering or irregular; *S. Etonia*, 11–12, nearly globular, sometimes flattened; *S. jamaicensis*, 11–13, mostly briefly tapering or irregular; *S. yucatanica*, 12–13, globular.

Large, 22 mm. or less.
S. umbraculifera, 13–20, globular or somewhat flattened; *S. mexicana*, 13–20, somewhat flattened; *S. Beccariana*, 15–16, pyriform; *S. bermudana*, 16–18, pyriform; *S. uresana*, 16–20, somewhat tapering or irregular; *S. Rosei*, 17–20, globular; *S. texana*, 18–22, nearly globular or somewhat flattened.

Very large, 27 mm.
S. Dugesii.

1. **Sabal minor**, Pers. Syn. Pl. i, 399 (1805). BUSH PALMETTO. Figs. 190, 192, 198, 199, 200, 201, 202.

Corypha minor, Jacq. Hort. Bot. Vindob. iii, 8, t. 8 (1776); Mayer, in Mem. de l'Acad. Roy. Sci. Berlin, 17 (1792: 1796).

Corypha pumila, Walt. Fl. Car. 119 (1788).

Chamærops acaulis, Michx. Fl. Bor.-Amer. i, 207 (1803).

Sabal Adansonii, Guersent, in Bull. no. 87 des Sci., Soc. Philomathique, Paris, 1804, 205, t. 25.

Rhapis acaulis, Willd. Sp. Pl. iv, pt. ii, 1093 (1805).

Chamærops louisiana, Darby, Geogr. Descr. Louisiana, 194; 205, 206, 216 (1816).

Sabal? adiantinum, Raf. Fl. Ludovic. 17 (1817).

Sabal pumila, Elliott, Sketch Bot. S. Car. i, 430 (1821).

Sabal minima, Nutt. in Amer. Journ. Sci., ser. i, v, 293 (1822).

Chamærops sabaloides, Baldwin, in Reliq. Baldwinianæ, 334 (1843).

Sabal glabra, Sarg. Silva, x, 38 (1896), based on *Chamærops glabra*, Miller, 1768, which cannot be identified; it was a dwarf palm from the West Indies grown in England; perhaps the juvenile stage of an arboreal species.

Sabal Deeringiana, Small, in Torreya, xxvi, 34 (1926); Journ. N. Y. Bot. Gard. xxx, 278–284 (1929).

Sabal louisiana, Bomhard, in Journ. Wash. Acad. Sci. xxv, 35 (1935).

Variable small unarmed palmetto, usually with a curved subterranean stem or rootstock and a short erect part whose crown comes nearly or quite to the surface of the ground but sometimes emerges into a trunk 2–3 or reported to 6 m. tall and 30 cm. thick and eventually becoming bare with a single leaf-bearing crown at apex: leaves either green or lightly bluish, stiff in appearance and very firm in texture; blade 6–15 dm. broad, divided two-thirds or more the depth into 16 or more glabrous segments (sometimes as many as 40) 2–5 cm. broad toward base and tapering to a long slender unequally 2-pointed apex; midvein of segment sunken on upper surface, elevated on under surface, with many thin veins either side of rib and cross-hatched underneath; length of segments 4–15 dm., the latter dimension on large plants with emergent trunks; filaments in leaf sinuses mostly very few or absent but sometimes present on both acaulescent and caulescent plants; palman about one-half to one-third length of blade; petiole shallowly plano-convex, 1.5–4 cm. broad, 1 m. or less long, hastula obtuse and broad, unequal-sided, usually very short but sometimes 3–5 cm. long, variable in size on the same plant, extension of petiole on under side of leaf (midrib) 4–20 cm. long depending on size of blade; large blades on caulescent plants sometimes (not always) breaking over at top of petiole and presenting appearance like a partially folded umbrella: inflorescences of 1 or of a few slender spadices, 5–20 or more dm. long, various in number of spathes and branches depending on size and vigor of plant and perhaps of age, erect at first and strongly exceeding the crown of leaves but overarching eventually if laden with fruit; spathelets or sheaths 8–12 cm. or

more apart, not inflated or foliaceous, divided part at apex 3–6 cm. long but much larger on big caulescent plants; spadix or flower-cluster from the sheath about as broad as long, commonly once-branched, 6–12 cm. long when beginning to bloom and at that time not far projected: flowers about 3 mm. long at anthesis, whitish, close together on axis but not crowded, not immersed, subtended by bracts or scales below the calyx; petals narrow, acute or narrowly rounded, much exceeding the shallow calyx; anthers conspicuous at anthesis but scarcely if at all extended, style stout but not equalling petals: fruit black, usually shining at maturity but sometimes dull, globular to oblate, nearly sessile, 8–13 mm. transverse diameter, long persistent in protected places; seed dark brown to almost black, flattened endwise, 6–8 mm. across, albumen white and very hard and homogeneous.

Lowlands, flat pastures, river bottoms, swamps, depressions, northeastern North Carolina as far north as Perquimans County, to mainlands of southern Florida, Alabama (as far north as the border line of Shelby and Jefferson counties), Louisiana, southwestern Arkansas (Lafayette County), eastern Texas to the eastward part of Edwards Plateau and southward to Aransas County, mostly on the coastal plain but extending to the piedmonts; often a troublesome weedy inhabitant of lands recently or not completely subdued. Well grown plants are attractive in cultivation, either as single specimens or in colonies.

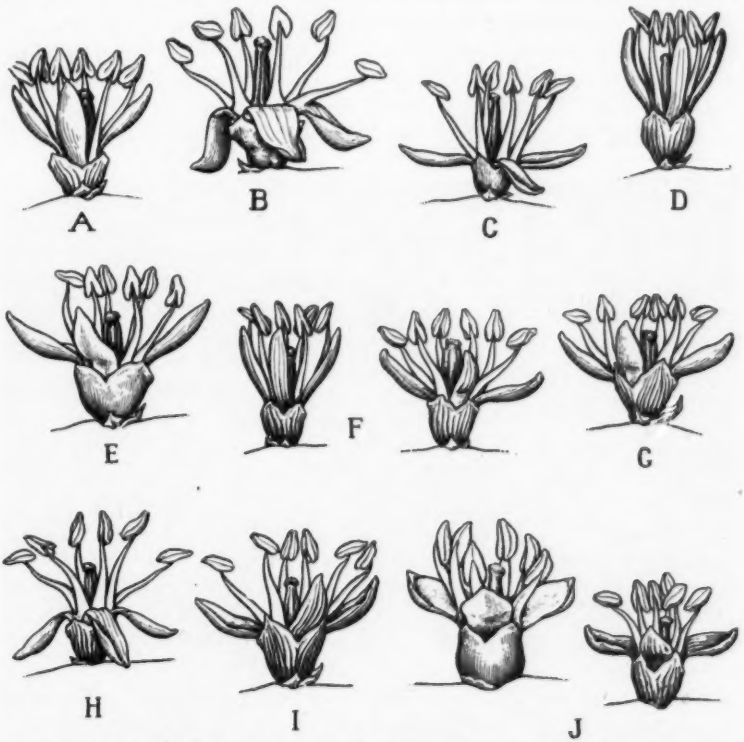
The caulescent or emergent tree-like plants of *Sabal minor* occur in parts of southern Louisiana and eastern Texas, usually as separates in certain areas of the acaulescent forms. Commonly a few trees stand out conspicuously with trunks several feet tall, eventually becoming bare; one usually sees many plants with intermediate short and shaggy trunks, while the major part of the area will show only the low acaulescent forms.

As large caulescents may arise in areas of the common acaulescents, so very dwarf and compact trunkless plants may also occur, with inflorescences only 16–24 inches tall and leaves of similar height (Fig. 200); specimens once were sent me of such dwarfs with the intimation that we might have a new species, a suggestion that appealed to me until I visited the area along Stanley Creek near Ora, Angelina County, Texas. The plants were very small and condensed, leaves often only 2 dm. across, and fruiting part only 4-5 dm. tall (16–20 inches). The bushlets occur in a large area of plants of ordinary dimensions. I could not discover the reasons for these depressed plants, of which there were many. One of them produced a short emergent trunk.

One may suppose that the acaulescent plants are capable of producing superterranean trunks, even though they may never arrive at that state. If one assumes that the caulescent plants are a separate species, then by the same token one must refer the acaulescent ones to the usual *S. minor*, inasmuch as there are no other consistent marks of separation; it is not unlikely that an entire diverse colony may have sprung from one ancestral

source. A point of view on these problems is stated in the section on the caudex system in the palmettoes, page 372. We are probably to regard the caulescent form as the normal or optimum status of the species, to which the acaulescent forms have not attained. Perhaps there is an evolutionary process involved in this situation for which we yet have no name and that cannot be expressed in our present taxonomic system.

My first sight of the tree phasis was at Frenier Beach by Lake Pontchartrain. I was impressed by the different aspect of the plant due to the breaking over of the leaf-blade at the top of the petiole, shown in Fig. 152 of my first Sabal paper, result perhaps of a diseased condition. I have now seen these trees in other places in which the leaves were not broken.



197. THE FLOWERS of Sabal, ×5. At A, *Sabal Etonia*. B, *S. mayarum*. C, *S. glaucescens*. D, *S. bahamensis*. E, *S. jamaicensis*. F, two flowers of *S. Palmetto*, one at left not yet fully expanded. G, *S. bermudana*. H, *S. Rosei*. I, *S. texana*. J, two flowers of *S. mexicana*, at left as fresh from the tree preserved in liquid, at right from same tree but dried. All except E and J left are from dried flowers.

No clear definite botanical differences are recorded between the acaulescent and caulescent phases of *S. minor*. In his Manual of the Southeastern Flora, Small separates *S. Deeringiana* mostly on stature; the other differences are minor and not exclusive; the contrasts between ellipsoid petals (*S. minor*) and suborbicular petals I cannot make out, even in some of Small's specimens. Contrasts stated in the literature are not impressive to me as specific botanical characters or else they may not hold when I study my specimens of *S. minor* that occupy twenty ample pigeon-holes.

If more than a single species is involved in *Sabal minor*, the characters of separation are not to be found only in the stature of caudex.

Persons who wish to read important recent accounts of *Sabal minor* in its broad sense may consult John K. Small in Torreya, xxvi, 33–35, in Journal of the New York Botanical Garden, xxiii, 161–168, also xxx, 278–284; Miriam L. Bomhard, Journal of the Washington Academy of Sciences, xxv, 35–44, also xxxiii, 170–182, Louisiana Conservation Review, autumn 1937, 37–42; R. M. Harper, Castanea, iii, 19–24.

The dwarf palmetto, *Sabal minor*, is cultivated in many regions remote

198. SABAL MINOR in fruit. Southeastern South Carolina. Two plants showing, leaf-tips of a third at lower left.

from its native territory and under several binomials as well as without name. I have taken it, with short trunk, in the Huntington Gardens, San Marino, southern California; also on grounds of Orthopedic Hospital (formerly Singleton Court), Los Angeles, with good emergent trunk. I have collected it at the Atkins Institution of Harvard University at Soledad, near Cienfuegos, Cuba, acaulescent, seeds for which had been pro-

199. BUSH PALMETTO in bloom, *Sabal minor*. Upper left, hastula and base of blade; upper right, full leaf from under side; in both cases the central cleft is shown at A.

200. SABAL MINOR. ×⅓. Leaf and spent flower-cluster of a very dwarf phasis in eastern Texas. A B C D hastulas from Georgia, Florida, Louisiana, consecutively, that at D from a plant with emergent trunk. Three flowers, the middle one having been preserved in liquid, others dried.

cured by J. G. Jack in the Cabada garden in Cienfuegos. I have collected the acaulescent phasis in Trinidad, British West Indies, as *Sabal acaulis;* in Demerara, South America (British Guiana) as *S. Adansonii;* in Rio de Janeiro, stemless, as *S. Adansonii, S. havanensis, Brahea serrulata* (name now represented by *Serenoa repens*). From Singapore, Malaya, I have specimens under the names *Sabal acaulis, S. princeps, S. Blackburniana.*

The genus Sabal, as a fully published name under the Rules, starts in 1804 by Guersent quoting Adanson. The text is ample, and two illustrations accompany it. The species then proposed was *Sabal Adansonii;* the earlier binomials *Corypha minor* of Jacquin and *Corypha pumila* of Walter are cited, but in that time there was no obligation to bring up an older name from another genus. The palm was grown in Paris. A good specimen of leaf and inflorescences of the plant is in Herbier Adanson, Muséum National d'Histoire Naturelle, Paris, of which I have had a clear photograph for some ten years. There can be no doubt of the plant intended by Adanson and Guersent. It was early grown in the Loddiges nursery in England and was well described and figured in Botanical Magazine in 1811, t. 1434, as *S. Adansoni.*

Similarly there is no doubt of the publication of *Corypha minor* by Jacquin in 1776. The description is full and the pictures excellent. The plant had been grown at Schoenbrun near Vienna, by Richard van der Schot, the plant having come from America.

Although *Sabal minor* is the "oldest" species in terms of taxonomy and basis of the genus Sabal, one does not conclude that it is genetically primeval, or that it represents the main or dominant evolution of the group. Probably we should have had a more correct estimate of the genus if *S. Palmetto* had happened to have been the descriptive starting point.

2. **Sabal Etonia,** Swingle ex Nash, in Bull. Torr. Bot. Club, xxiii, 99 (1896). SCRUB PALMETTO. Figs. 197, 203, 204, 205.

S. Adansoni var.? *megacarpa,* Chapman, Fl. So. U. S. ed. 3, 462 (1897).

S. megacarpa, Small, Fl. Southeast U. S. 223 (1903).

Small palm, foliage standing 1–2.5 m. above ground and with short or lopping inflorescences not exceeding the leaves, trunk usually wholly subterranean and mostly very crooked, even spiralled, often S-shaped, with cord-like roots from lower side, sometimes superterranean and prostrate or inclined or leaning, or even erect to 2 m. or more tall and more than 1 m. in circumference at base with either shaggy or bare surface, leafage green: leaves several to many, usually 4–6, costapalmate and decurved, abundantly filiferous, glabrous, blade 1 m. or more across in either direction, the strong costa extending through it and the palman occupying about one-fourth the length; segments 60 or more on large strong leaves, 7–9 dm. long,

201. SABAL MINOR with emergent bole, at Frenier Beach, near New Orleans, the phasis known also as *Sabal Deeringiana* and *S. louisiana*.

lateral ones drooping, central ones 3–4 cm. broad at base and the others much narrower, all long-bifid and terminating in slender caudate points, secondary veins many and very fine; petiole 1 m. and more long, slender, 3–5 cm. broad, flattish or slightly concave and with a central ridge on upper surface; hastula small, 4 cm. or less long or frequently only half that length, margins plane or somewhat uprolled: inflorescences or spadices much branched, shorter than leaves, spreading or lopping or prostrate, only seldom erect, clusters 10–12 alongside a continuing rachis and 15 cm. or less long in fruit, the terminal one usually much longer, nodes short, nodifronds acuminate-pointed: flowers loosely placed on rachillæ, 5 mm. long at anthesis, petals erect-spreading and somewhat shorter than the thick anthers and equalling or somewhat exceeding the stout columnar pistil: fruit shiny black at full maturity, variable in size and shape, from practically globular and 11–12 mm. in either diameter to oblate and 15–30 mm. broad and 12–16 mm. high; seed chocolate-brown, corresponding to size of fruit but always oblate (flattened on both ends), 8–13 mm. broad, immersed in pulpy mesocarp that becomes firm and spongy when dry, micropyle very small, midlateral.

Peninsular Florida, from Marion County to Dade County, on dry pinelands and in scrub, common even though long overlooked as if it were an undeveloped form of *S. Palmetto;* sometimes the colonies are sterile. I know the emergent or tree form east of Oklawaha River in the southeastern corner of Marion County, where I have seen a straight erect trunk 8 feet tall, and other trunks practically prostrate or leaning on oak trees.

The specific name is an Indian noun in apposition, from an area in Lake County where the type was taken "in the vicinity of Eustis," known locally as the Etonia Scrub. Type specimens are in the National Herbarium, Washington.

3. **Sabal mayarum,** Bartlett, in Publ. no. 461, Carnegie Inst. Wash. 35 (1935). SMALL BOTAN. Figs. 197, 205.

Small palm, 4 m. tall: leaves about 2 m. across, light green but not glaucous, lighter colored underneath, texture thin, cut nearly to base into many narrow segments so that the palman is only 15–20 cm. long or even almost lacking; segments perhaps 3.5 cm. broad at base but soon divided into narrow long-pointed but not filamentous ends that are 25–30 cm. long, filaments either noticeable or almost lacking in the sinuses, midrib rather prominent and lateral veins well pronounced, cross-veins many but faint; petiole narrow, about 2 cm. broad at apex and continued into the blade 60 cm. long as a rachis or midrib; hastula very short, triangular, acute or acuminate, 2–3 cm. long, margins not prominent and upraised: inflorescences or spadices much branched, length 1 m. or more, spathelets or sheaths finely striate, those in the flowering part with a pointed apex 2–3 cm. long and much shorter on the upper nodes, the orifice more or less tinged brown, rachillæ 3–6 cm. long, slender, sharply angled when dry, rachis of each cluster conspicuously flattened: flowers small, 3–4 mm. long when expanded, contiguously placed but not congested on rachilla, sub-

tended by 3 unequal bractlets; calyx about 1.5 mm. high, not costate, the 3 lobes obtuse and spreading; petals flat open at anthesis and subsequently sometimes becoming depressed but not reflexed, the corolla 4–5 mm. across when dry, the stamens and style upstanding: fruit not described.

British Honduras: Maskall, Belize District, *Gentle 1156* (type); Corozal District, *Gentle 602, 628.*

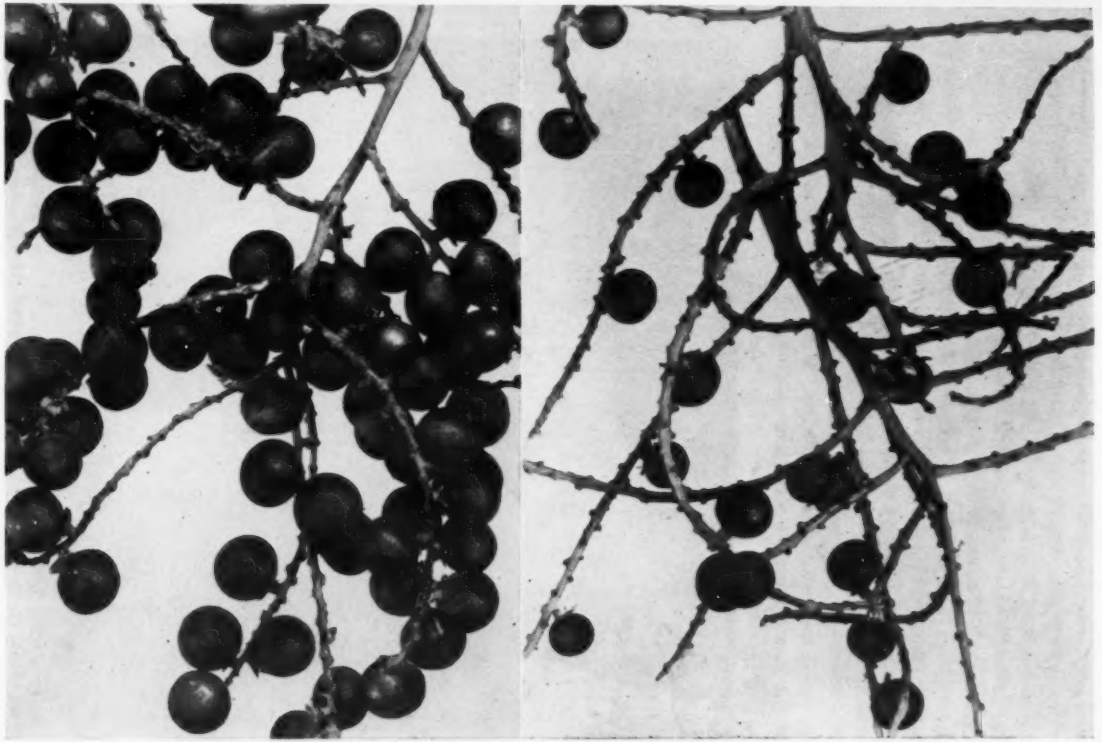
The species is assigned to Yucatan by Bartlett on the basis of *Schott 196* and *Gaumer 1359, 21464, 21466* (24164, 24166?) and probably *23967;* also to Cuba, *Britton & Cowell 9845,* at Galafre, Pinar del Rio. The Cuban occurrence is apparently good *Sabal Yapa;* the Yucatan material (Schott, Gaumer) I think is not *S. mayarum* but it is too meager for definite determination; it may be *S. yucatanica.*

Aside from its lower stature and very different hastula and short palman, *S. mayarum* has much thinner and less plicate leaves than *S. yucatanica* and light colored to almost silvery underneath, filaments often evident in sinuses.

4. **Sabal glaucescens,** Lodd. ex Martius, Hist. Nat. Palm. iii, 320 (1850) *nomen,* stated on page 247 to be native to Trinidad and the name is itself aptly descriptive, under the genus Corypha; Walp. Ann. v, 817 (1860) et al.; J. H. Hart, Herbarium List, Bot. Dept. Trinidad (1908) kept separate from *S. mauritiæformis;* Freeman & Williams, Mem. Dept. Agr. Trinidad and Tobago, no. 4, 151 (1927). CARAT. Figs. 197, 206, 207.

Erect palm to 16 m. and perhaps more, trunk slender, straight, or curved because of contingencies, soon cleaning itself, very obscurely and irregularly ringed; head or crown very open due to long slender petioles and much-projecting flower-panicles and the lower leaves drooping while still green: leaves thin in texture, light green above and bluish glaucescent underneath, about 1–2 m. across, the blade divided into about 4 parts and irregularly cut almost to base and palman therefore irregular and little evident, segments 6–7 cm. broad at base, 1 m. more or less long, about 3-ribbed but main costæ not unusually prominent nor the blade with a fluted look, intermediate veins faint and surface indistinctly cross-lined; hastula becoming long and the sides infolded, 3–5 cm. long: inflorescences conspicuously projecting and branched beyond leaves, rachillæ many but short, 3–5 cm. long, closely flowered: flowers about 4 mm. long at anthesis and wide open, sessile; calyx sessile, not striate, shallowly toothed; petals very narrow, slightly exceeded by anthers and nearly or quite equalled by the slender pistil: fruit black or brown-black at maturity, pyriform or globular-pyriform, straight rather than lop-sided, 8–10 or 12 mm. broad and of similar length; seed 7–8 mm. across, not imbedded in a mesocarp, micropyle rather prominent, lateral.

Trinidad, British West Indies: near Port-of-Spain, wild, *R. O. Williams;* Mayaro, *Bailey 661.* Botanic Gardens, Georgetown, Demerara, *Bailey 526,*

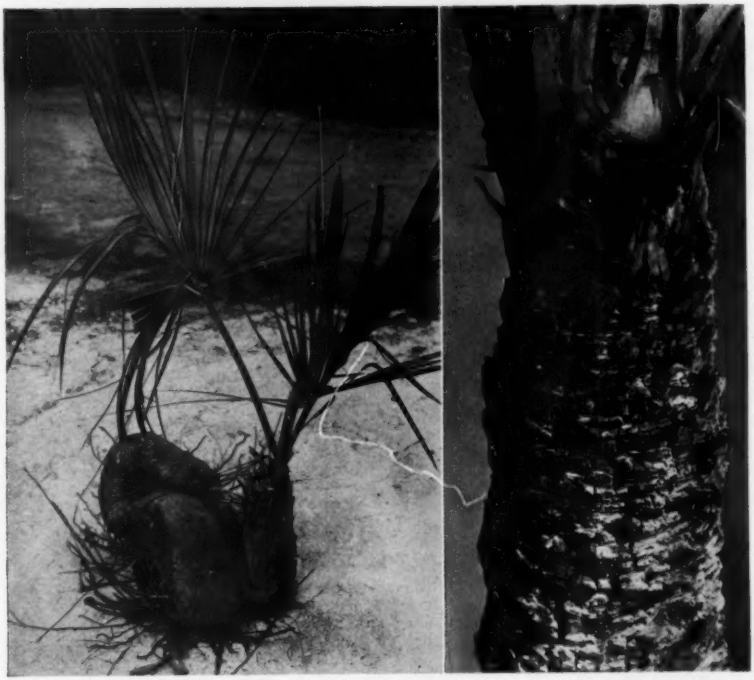


202. SABAL MINOR. Fruits from the phasis with emergent trunk, showing the wide variation. Left, from the wild near New Orleans; right, from tree planted in a park in Los Angeles. Natural size.

planted; Botanic Garden, Dominica, British West Indies, *Bailey*, planted; Jardim Botanico, Rio de Janeiro, Brazil, *Bailey 618*, planted. Differs from *S. mauritiæformis* in smaller size of tree, less ridged or fluted leaf-segments which are glaucous underneath, long-projecting flower-clusters, larger flowers, straighter less lop-sided more globular fruits. We know as yet only this one species of Sabal native on Trinidad.

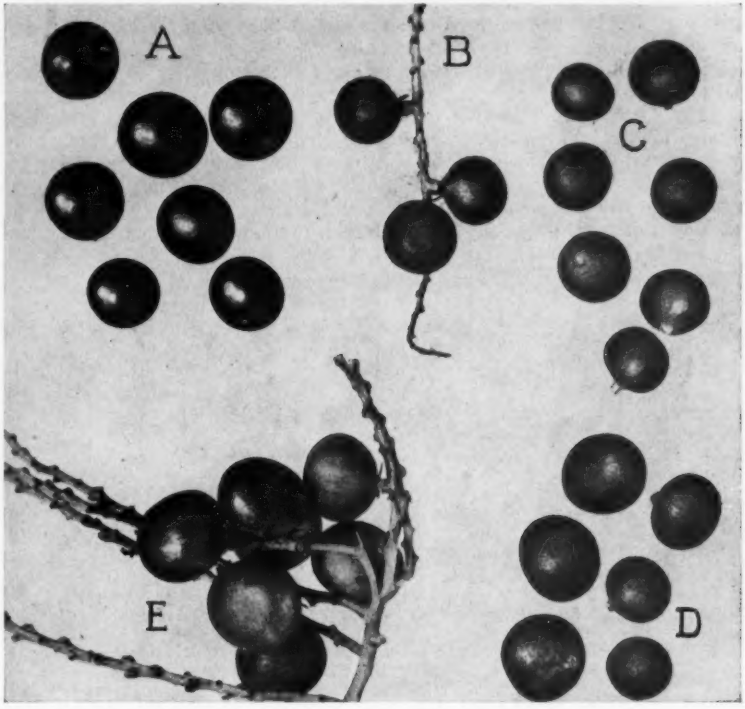
Since Grisebach in 1864, the Carat of Trinidad has been referred to Palma amarga, *Sabal mauritiæformis*, but it was not until I saw the latter in Colombia that I was prepared to follow horticulturists and planters in separating the two.

The name *glaucescens* of Loddiges has been applied to the Trinidad palm, but it has had a devious history. Martius cites the name, following Loddiges in stating that the palm came from Trinidad. Loudon in his



203. Sabal Etonia in Florida. At left, the usual form with crooked or contorted subterranean trunk, the species supposed to be acaulescent. At right, one of many plants near Oklawaha River with emergent bole, sometimes six to eight feet high, lacking the usual Sabal leaf-scars.

Hortus Britannicus, 1839, assigns it to the East Indies, but subsequent authors do not follow him. Walpers in his Annales, 1860, attributes it to Trinidad, undoubtedly following Martius. Grisebach in his Flora of the British West Indian Islands, 1864, puts it in synonymy under *S. mauritiæformis*, as undescribed and "probably the same palm." The name appears in lists but without description. Freeman & Williams have it in The Useful and Ornamental Plants of Trinidad and Tobago (Mem. no. 4, Dept. Agr. Trinidad and Tobago, 1927) with, however, a brief descriptive account so that the palm is more or less identifiable botanically. They state that the palm "is very abundant in some districts of the Colony. Its leaves form an excellent and very durable thatch." All this history lacks the accuracy of botanical work at the present day but there is no doubt as to the palm that was intended. If we do not stabilize the name *glaucescens* we are



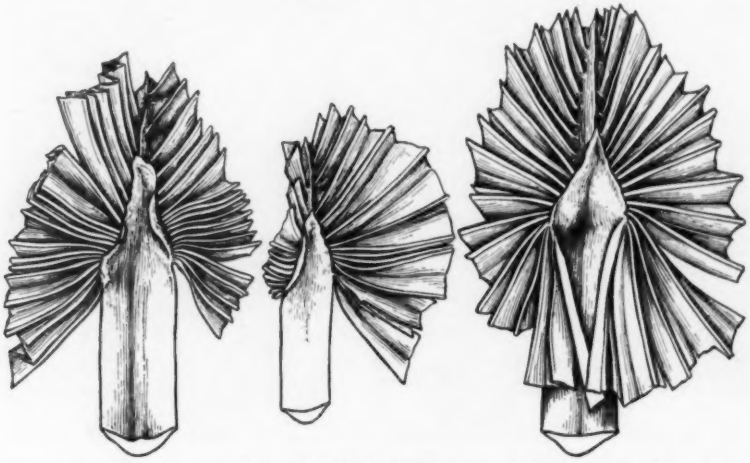
204. VARIATION IN FRUITS of *Sabal Etonia*, natural size, Florida. A. Altoona, Lake County, type locality. B, Dade County. C, D, E, Marion County, different plants.

not only obliged to invent a new name but to stop the further popular use of the old one, which would be an impossible procedure with planters. The case for *glaucescens* is at least as good as that of *Sabal Palmetto*, brought over from the insufficient description of *Corypha Palmetto* by Thomas Walter, in whose account the best identification is provided by the specific word *Palmetto* itself, even though it is not descriptive. If I am not allowed under the Rules to hold the name *S. glaucescens* then I must equally discard *S. Palmetto*.

† 5. **Sabal peregrina,** spec. nov. Figs. 208, 209.

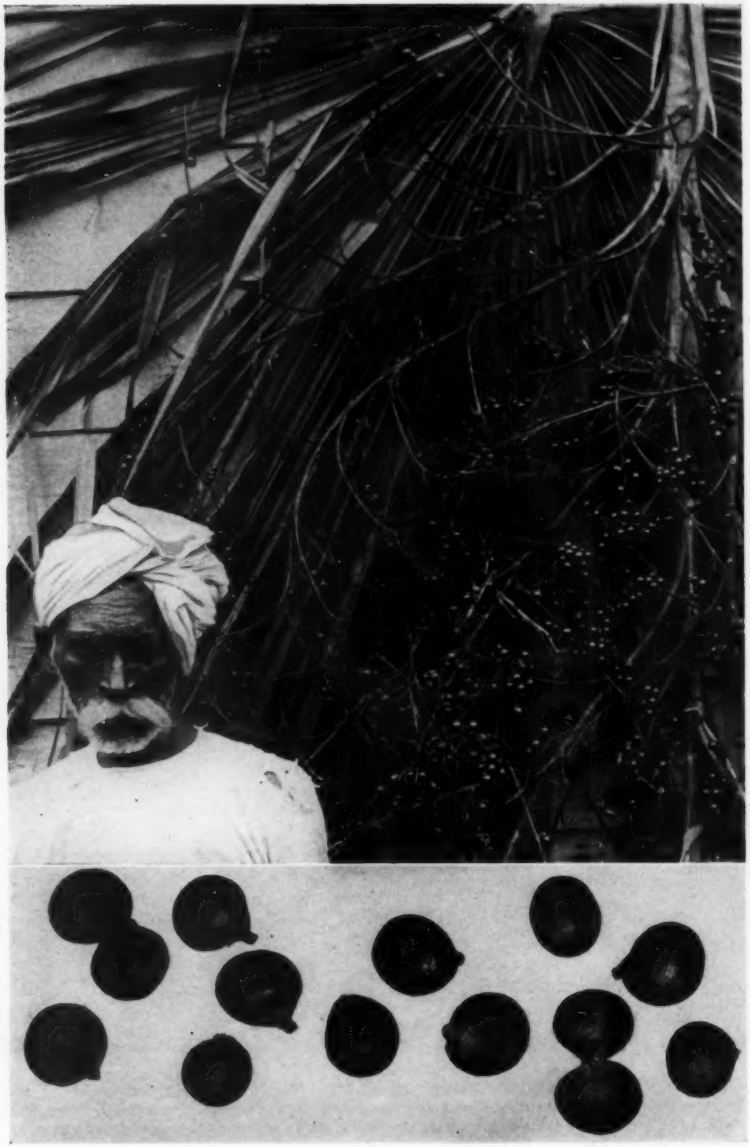
Erecta sed non stricta, 8 m. alta, basis trunci 6 dm. crassa; coma compacta, segmentis longis pendentibusque: folia non rigida, lætevirentia, non glauca, 1–2 m. lata, palman brevissima vel pæne absens, filamenta nulla in sinubus; segmenta 4 cm. vel minus lata basi, angustata ad longos, graciles, flexiles et nutantes apices; petiolus longus, excedens laminam, 10–12 cm. latus prope basim; hastula brevis latissimaque, non acuminata, circa 7 cm. lata: spadices breviores quam folia, multi-ramosi, diffusi, pendentes fructu maturo, rami laterales 18–20 cm. longi: fructus nitidus, niger, globularis basi angusta, 10–12 mm. diam.; semen 6–7 mm. latum, situm in duro mesocarpio, micropyla lateralis et parva.

Erect palm 8 m. tall but not strict, trunk rather slender except at swollen base which may be 6 dm. thick, slowly cleaning itself and leaving an irregularly ringed surface but in the meantime likely to be ragged with hanging shreds of leaf-bases; head compact, notable for the many long-hanging segments: leaves light green, not glaucous, flexible in texture or at least not hard and stiff, 1–2 m. across, palman very short so that the



205. SABAL ETONIA, two on left, of which the left-hand one is from a tree with emergent bole. SABAL MAYARUM at right, hastula from British Honduras. All ×½.

206. SABAL GLAUCESCENS, the Carat of the island of Trinidad. Palman is very short, so that the leaf does not show a strong costapalmate form; inflorescences much extended beyond the leaves. Under surface of leaves prominently glaucescent. A slender graceful tree.



207. SABAL GLAUCESCENS. From a tree planted in Demerara. Note the hastula at the top. Fruits natural size, two of them with two carpels developed.

segments extend nearly or quite to the hastula, filaments none in sinuses; segments 4 cm. or less broad at base, midrib and perhaps two side-ribs prominent but the leaf not ridged, ends long and narrowly acuminate but not filiform, bent or knuckled over about midway so that the ends hang prone; petiole exceeding blade, nearly flat on top except for a slight central ridge but convex toward the base, where it becomes 10–12 cm. broad; hastula short and broad, about 7 cm. long, blunt-pointed: inflorescences or spadices shorter than leaves, much branched and diffuse, usually very floriferous and either hanging prone when in fruit or lying on the petioles and blades, side branches 18–20 cm. long, sheaths or spathelets strongly striate and the short point mostly breaking away by fruiting time: flowers not seen: fruit shining black when ripe, 10–12 mm. thick when dry and mature, globular but more or less tapering to a stalk at the apex of which the somewhat accrescent floral envelopes persist as reflexed pointed parts; seed 6–7 mm. across, closely embraced in a hard somewhat adherent mesocarp, micropyle lateral and small.

Known to me only as a planted palm. Type, Key West, Florida, in a yard at Duval and Caroline streets, *Bailey 2D H, 322x*, in prime fruiting condition in 1935, beginning to fail in 1938. Trois Ilets, Martinique, French West Indies, in an old public yard, *Bailey 267*. Barranquilla, Colombia, on a private property, *Bailey*. Jardim Botanico, Rio de Janeiro, Brazil, as *Sabal Ghiesbrechtii, Bailey 639*. I reported the Brazilian tree in my Sabal monograph of 1934 (Gent. Herb. iii, 336) as "a striking palm with characteristics quite unknown to the writer."

† 6. **Sabal viatoris,** spec. nov. Figs. 209, 210, 211.

Arbor altitudine mediocri; coma sparsa, petioli longi, segmenta angusta pendulaque: folia magnitudine mediocri vel parva, 1–2 m. lata; palman 8–16 cm. longa; segmenta angusta, circa 2 cm. lata basi, apices longi et postea filiformes, lætevirentes subter et supra, sinus filiferi; petiolus longus gracilisque, 2–3 cm. latus medio; hastula 6–8 cm. longa, acuminata: spadices breviores quam folia, multi-ramosi, pendentes fructo maturo; rachillæ validæ, 2 mm. crassæ cum siccæ, 6–8 cm. longæ: fructus nitidus, globularis, 8–9 mm. diam.; semen obscure brunneum, 4–5 mm. latum, liberum in mesocarpio, micropyla submersa et superlateralis.

Erect tree of medium stature, trunk in the type tree (planted) covered with persistent leaf-bases in the regular palmetto pattern (although becoming bare at base) and also much fiber; head open because of the long petioles and short palman so that the segments extend nearly to base of blade: leaf of medium or small size, 1–2 m. across, light green on both surfaces, thin in texture, sinuses prominently filiferous; segments narrow, not much if any exceeding 2 cm. broad at base, very long-attenuate and the slender upper part bending over and hanging, midrib prominent on lower part and the several lateral veins thin and inconspicuous, cross-hatching obscure or lacking; palman 8–16 cm. long; petiole long and slender, 2–3 cm. broad above base, shallowly concave to flat on upper surface; hastula narrow and long-acuminate, 6–8 cm. long, the narrow margins little if at all upturned: inflorescences shorter than leaves or even of

208. SABAL PEREGRINA as grown at Key West, Florida. Note the conspicuously drooping segments, the palman being short. Fruit natural size. Planted in many regions, but nativity unknown.

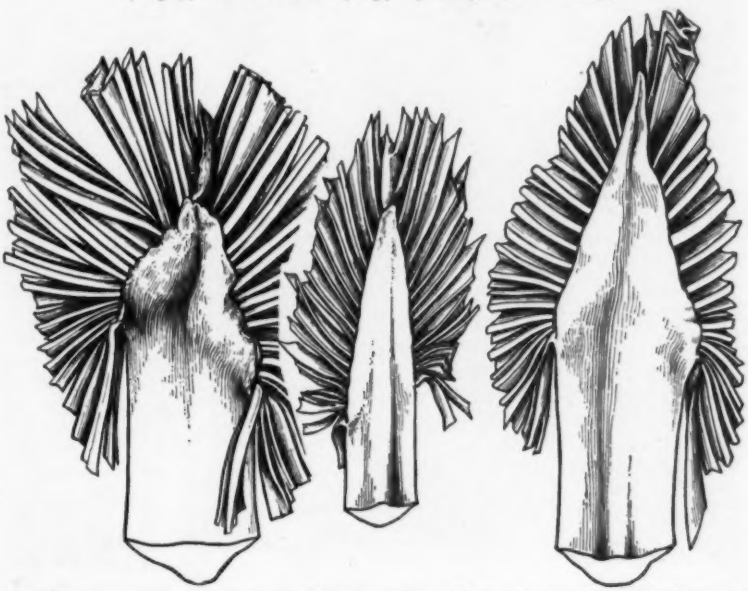
petiole, closely branched, hanging prone in fruit, individual clusters small and compact; rachillæ stout, 2 mm. thick when dry, 6–8 cm. long: flowers unknown: fruit shining black or brown-black, globular, 8–9 mm. thick, stalk prominent; seed dull brown, 4–5 mm. crosswise diameter, free in an independent firm mesocarp, micropyle sunken and superlateral.

Type tree in cultivation in Huntington Botanic Garden, San Marino, California, *Bailey 9248, 399*, under the name *Sabal longepedunculata*.

This viator has no acknowledged habitat. The name *longepedunculata* appears as a *nomen nudum* in 1907 in a list of plants grown in Belgium.

The tree here described from the California garden has no longipedunculate character. The plant in the Huntington Gardens I saw and collected in 1927 and again in 1937 when it had grown much taller, as shown in Fig. 210. In 1944 the Curator, William Hertrich, sent me other fruits from it. In my Sabal monograph I referred this tree to *S. Palmetto* (Gent. Herb. iii, 308), a disposition I am now glad to correct.

7. **Sabal mauritiæformis,** Grisebach & Wendl., Fl. Brit. W. Ind. 514 (1864), as *mauritiiformis;* Becc. in Webbia, ii, 61 (1907). PALMA AMARGA. PALMA DE VACA. Figs. 188, 212, 213, 214.
Trithrinax mauritiæformis, Karsten, in Linnaea, xxviii, 244 (1856); Fl. Columb. ii, 137–8, t. 172 (1862–1869).



209. THREE HASTULAS, ×¼. Left, *Sabal peregrina*. Middle, *S. viatoris*. Right, *S. yucatanica*.

Tall rather slender tree, 10–23 or 24 m. tall, trunk about 3–4 dm. diameter at maturity, soon self-cleaning and ringed; head open due to the deeply split leaves, long petioles and many drooping segments: leaves soft in texture and leaving on the hands a waxy feel when specimens are prepared, grassy in substance (my horse ate part of one leaf), blade 2 m. and more long and broad, shining green above and somewhat bluish but not glaucous underneath, palman short and only 5–8 dm. long; segments 60 and more, upwards of 1 m. long, 6–10 cm. broad at base, midrib and two or more side-ribs very strong so that the part has an almost fluted look, intermediate nerves indistinct, surface faintly cross-hatched with curved lines, filaments lacking or practically so, points very attenuate and slender even to filiform; petiole 1–1.5 m. or more long, vaginate at base; hastula relatively small, acuminate, 6–9 cm. long, margins not broad: inflorescences

210. SABAL VIATORIS, as grown in southern California. Note the deeply divided leaves and the short heavy fruit-clusters.

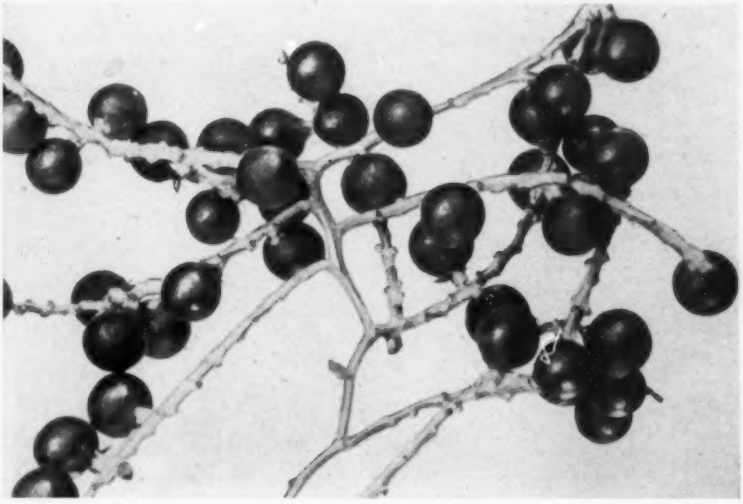
equalling or somewhat longer than the leaves, heavily flowered, bracts or spathelets striate and short-pointed, rachillæ 4–8 cm. long and sometimes branched, terete: flowers small, about 3 mm. long at anthesis, sessile, calyx not striate, dentate; petals narrow, acute, much exceeding calyx and at maturity widely spreading and not quite equalling the anthers and somewhat longer than the stout pistil: fruit black at maturity, pea-shaped or globular with irregular or one-sided tapering base, 10–11 mm. broad and somewhat less in height; seed small, 7–8 mm. across, not in a mesocarp, micropyle obscure, supralateral.

Colombia, in the northern part and Cauca Valley. Vicinity of Turbaco, Department Bolivar, *Killip & Smith 14291:* near Cartagena, *Bailey 249:* Barranquilla, Department Atlantico, *Bro. Elias 1550.* Reported from Venezuela. Named apparently for resemblance of the tree to the Mauritia palms of South America, but originally contrasted by its author with *Trithrinax brasiliensis*, when the Sabal concept was not well understood.

8. **Sabal Yapa,** Wright ex Becc. in Webbia, ii, 64 (1907); Pomona Coll. Journ. Econ. Bot. ii, 376 (1912); Bailey, Gent. Herb. iii, 321 (1934). CANA JATA. Figs. 214, 215, 216.

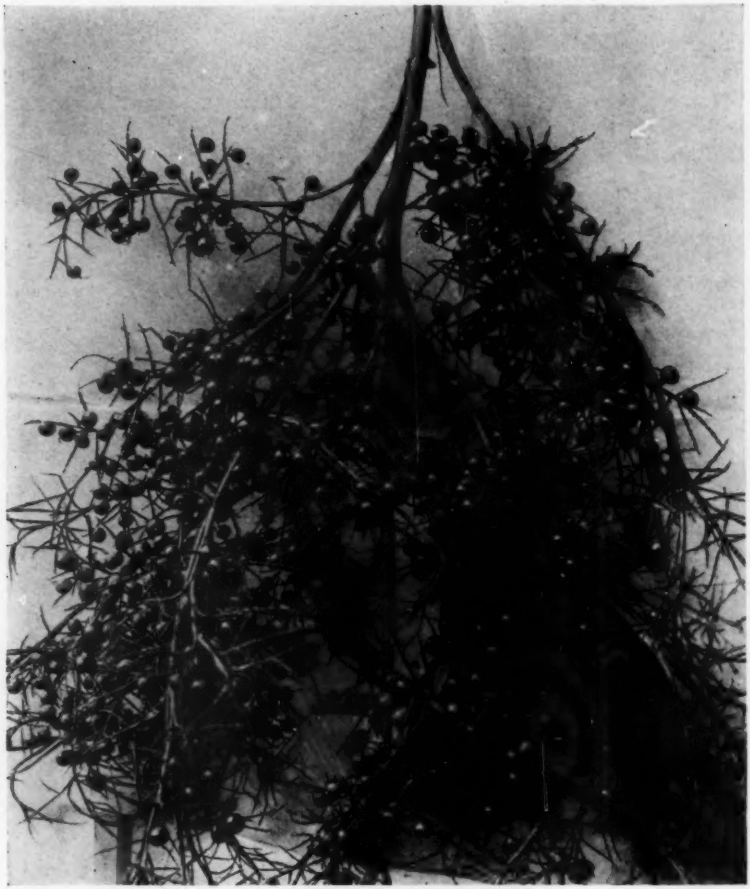
Inodes japa, Standley, in Contrib. U. S. Nat. Herb. xxiii, pt. i, 71 (1920).

Sabal japa, Bartlett, in Publ. no. 461, Carnegie Inst. Wash. 36 (1935).



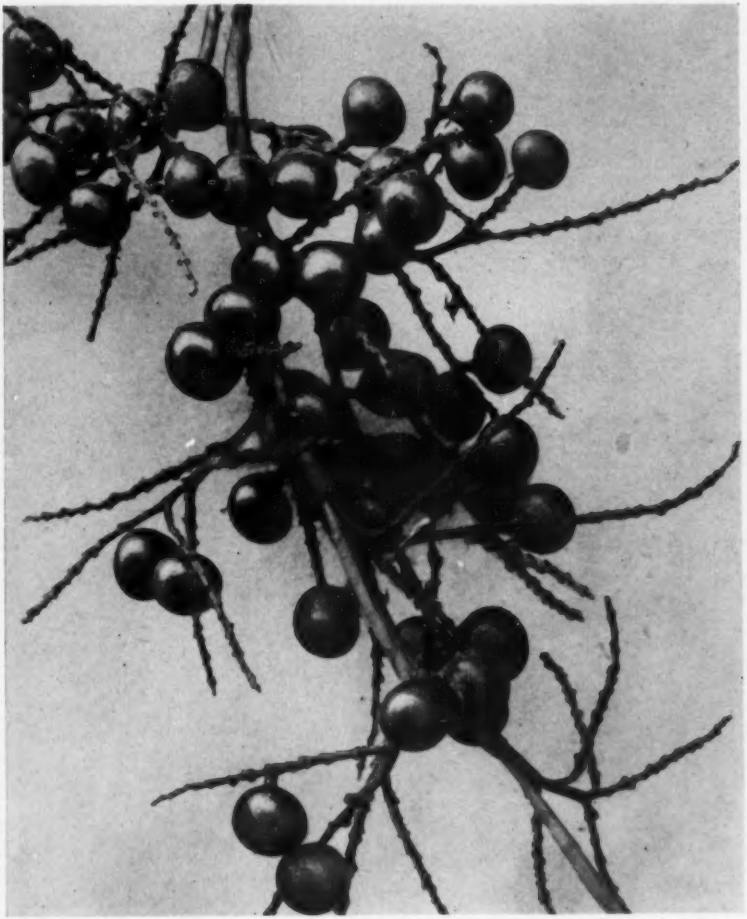
211. THE SMALL FRUITS of *Sabal viatoris*. Natural size.

Tree of small or medium size, sometimes to 10 m. and perhaps more, with a very open loose tousled head due to the long petioles and deeply cut leaves with spreading and hanging segments; trunk at first heavily covered with petiole bases but soon becoming bare and rough-ringed: leaf-blade light green, cut nearly or quite to the base so that there is little or no palman, the blade not so strongly downwardly curved and costapalmate as in most palmettoes, filaments nearly or quite lacking; segments 60 or more, 1 m. and more long, 4–5 cm. broad at base, midrib sunken on upper



212. Sabal mauritiæformis. A heavily laden prufusely branched fructescence from the region of Cartagena, northern Colombia.

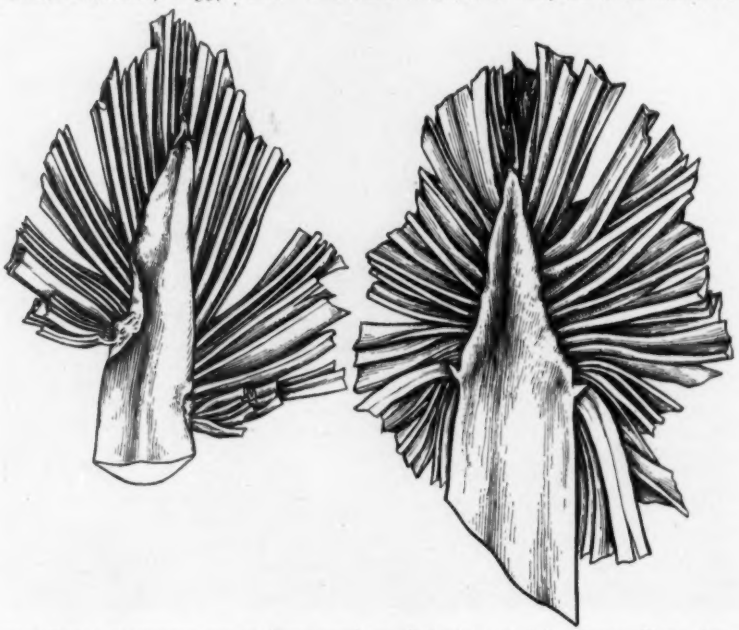
face and strongly upstanding underneath, the lateral veins many and close together, and more or less faint cross-hatching; the practical absence of palman gives most of the segments a twice-divided character, the basal part being perhaps 20 cm. long with 3 strong ribs, then two succeeding parts 40–50 cm. long each with one strong rib, each of these two parts being split one-quarter to one-half the length into 2 very narrow long-pointed unequal lobes, this conformation varying somewhat with the area of the



213. SABAL MAURITIÆFORMIS. Fruits natural size in Cartagena region, Colombia, photographed when fresh from the tree.

leaf under observation; petiole 1 m. and more long on large leaves, often or usually exceeding the blade, convex on lower face, broadly convex on upper face and obscurely ridged toward the top; hastula relatively short, 5–7 or 8 cm., much narrowed toward the pointed top, the edges upturned: inflorescences or spadices commonly much exceeding the leaves and therefore conspicuous, much branched; rachillæ 4–10 cm. long, glabrous, terete when fresh: flowers about 5 mm. long when fully emerged but shorter at first, sessile, calyx tubular and shallowly dentate; petals acute, somewhat exceeding the calyx, erect at first but soon spreading and then deflexed, somewhat less in length than the prominent oblong anthers, the long entire pistil conspicuous: fruit globular-pyriform, the short tapering base ending in a constriction or stalk, 9–11 mm. thick, sometimes oblique, in some cases 2 irregular berries developing from one flower; seed depressed, about 7 mm. across, not intimately involved in mesocarp, micropyle not prominent.

Western Cuba, on rocky areas and in bush with *S. parviflora* and other palms. Species based by Beccari on Charles Wright number 3971 preserved in herbarium at Berlin, collected sometime in the 1860's, without locality although he used (as for many other western plants) his labels printed "in Cuba Orientali, 1859, 1860." Province Pinar del Rio, on a savanna at



214. Sabal mauritiæformis from northern Colombia, at left. Sabal Yapa from Cuba, at right. ×1/2.

Boquerón, *Bailey 15183:* Province Habana, at La Pita, foot of the Sierra de Bejucal, *Bailey 331*, at Batabanó, *León 14160, 14161, Bailey 12548*, at Pozo Redondo, *Bailey 12564*, San Peta, *Roig & Van Hermann.*

The specific name has been spelled *Japa*, which is in consonance with

215. SABAL YAPA in the wild, western Cuba. Take note of the open head, short palmans, projecting inflorescences.

Spanish usage, but, as I stated in my Sabal fascicle (Gent. Herb. iii, 322) it remained for Beccari in 1907 to publish the name and to draw diagnosis from Wright's specimen in Berlin. He made the name Yapa, which he implies is the way Wright spelled it on his label, "which, being the first tenable publication, must stand; in any case, Japa and Yapa would be pronounced alike as a specific name." The fact that Beccari also spelled it Yapa five years later in his Palms of Cuba (Pomona Coll. Journ. Econ. Bot.) shows that he did not desire to change or correct the name.

Beccari assigned *Sabal Yapa* to Yucatan on the basis of a specimen collected there by Gaumer. I had examined the Gaumer specimen in preparing my Sabal paper of 1934, and made the same disposition of it, but it is probably *S. yucatanica:* see pages 396, 418.

† 9. **Sabal Morrisiana,** Bartlett, spec. nov. Silvery Botan. Figs. 217, 218.

S. Morrisiana, Bartlett, in Publ. no. 461, Carnegie Inst. Wash. 22, fig. 1, pl. 3, figs. 1 and 2, pl. 6 (1935), *sine descriptione:* Lundell, Veg. of Petén, Publ. no. 478, Carnegie Inst. Wash., 53 (1937).

Altissima gracillimaque, ad 27 m. alta, truncus 25 cm. diam., lignus durus: folia circa 2 m. lata, lætevirentia supra et argentea infra, fibræ paucæ vel nullæ, palman brevissima; segmenta 4–5 cm. lata basi, sed angustissima vel etiam filiformia ad apicem et nutantia; hastula 7–10 cm. longa, anguste acuminata: inflorescentia excedens folia, multi-ramosa; rachillæ validæ, 1–2 mm. crassæ medio, non filiformes, 5–7 cm. longæ: fructus globularis brevi angustaque basi, niger, nitidus, 9–10 mm. diam.; semen liberum, 7–8 mm. diam., micropyla lateralis et prominens.

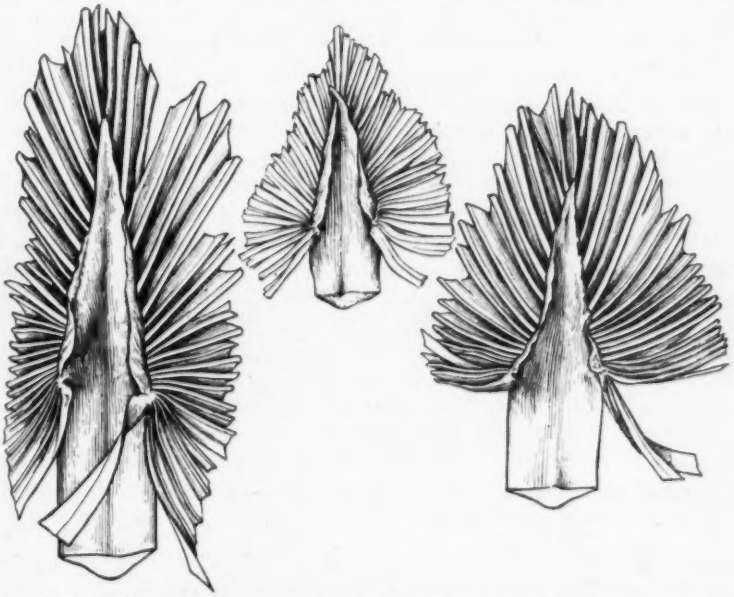
Very slender and tall, to 27 m. high; trunk 20–25 cm. diameter, smooth, light colored, wood hard: leaves 2 m. more or less across, very deeply cut so that the palman nearly disappears, light green above and silvery on under surface, intersegmental fibers few and short or even wanting; segments 4–5 cm. broad toward base but most of the way 3 cm. and less and long-tapering into very narrow or even filiform and drooping ends, midrib well marked but other longitudinal veins inconspicuous, cross-hatching abundant and strong; petiole at least equalling the blade and on young plants much longer, shallowly concave on upper face and apparently not centrally ridged, more or less scurfy; hastula 7–10 cm. long, long-acumin-

216. Fruits of *Sabal Yapa,* two at left, with thick interior mesocarp; of *S. causiarum* three right, with mesocarp hardly evident. Nearly twice natural size.

ate, the margins narrow and not prominently upturned: inflorescences or spadices conspicuously exceeding the leaves, divaricately branched; rachillæ stout, terete, at least 1 mm. thick at middle when dry and sometimes more, not filiform at end, 5–7 cm. long; spathelets or sheaths dark brown and triangular-pointed at apex, finely striate: flowers not known: fruit black, shiny, globular with somewhat tapering base, 9–10 mm. across, 10–11 mm. high with the stalk; seed free within a hard thin mesocarp, shining dark brown, 7–8 mm. across, micropyle lateral and prominent.

Guatemala, Department of Petén, at Uaxactun, in forest, *H. H. Bartlett 12284*, cited by Bartlett as type top of page 36, Carnegie Publication 461. British Honduras, on high ridge in Stann Creek Valley, *Gentle 3103*. Dedicated "in honor of D. Morris, author of the interesting book The Colony of British Honduras, London, 1883." Sir Daniel Morris, who died in 1933 in his eighty-ninth year, was Assistant Director of the Royal Botanic Gardens, Kew, 1886–1898; remembered in *Thrinax Morrisii*.

In describing his *Sabal nematoclada* from British Honduras Burret thinks it may be the same as the *nomen nudum S. Morrisiana* of Bartlett, but the two appear to be clearly distinct in the thicker terete more loosely flowered rachillæ of the latter, somewhat larger and apparently less pyri-



217. SABAL MORRISIANA at left, about one-half full size, from Petén, northern Guatemala. SABAL NEMATOCLADA at right, about one-half full size, from British Honduras. SABAL ALLENII, in middle, about one-third full size, from Perlas Islands, Panama.

form fruit, thinner less strongly ribbed leaf-segments with filiform tips, much longer hastula. Undoubtedly other dissimilarities will appear when these palms are compared in the field, in case they are not disclosed to be wide variants of a single species.

10. **Sabal nematoclada,** Burret, in Fédde, Repert. xlviii, 256 (1940). Green Botan. Figs. 217, 218.

Very tall and slender palm, to 27 m. high: leaves large, about 2 m. long, green on upper face, lighter colored but not silvery underneath, very deeply divided into many segments, the palman therefore short (probably 30 cm. or less); segments about 6 cm. broad, at apex divided into 2 very long and very narrow but not filiform hanging parts, midrib very strong; hastula narrowly acuminate but small, about 6 or 7 cm. long: inflorescences or spadices much branched and brush-like, spathelets striate and acuminate, blackish at apex when dry; rachillæ very thin, at middle about 1 mm. thick, apex almost filiform, to 10 or 12 cm. long at full growth: flowers cream-colored, closely placed, small, about 3 mm. long, subtended by ovate-acuminate bracts and bractlets; calyx narrowly obovate-oblong, not conspicuously nerved, with 3 ovate-triangular lobes; petals when dry narrow with involute margins: fruit black or nearly so, shining, obovate-pyriform, 8–9 or 10 mm. diameter, and usually 1 mm. longer counting the stalk and adherent parts of perianth; seed about 8 mm. across when full grown, contained in a thin not adherent mesocarp, micropyle supralateral and obscure.

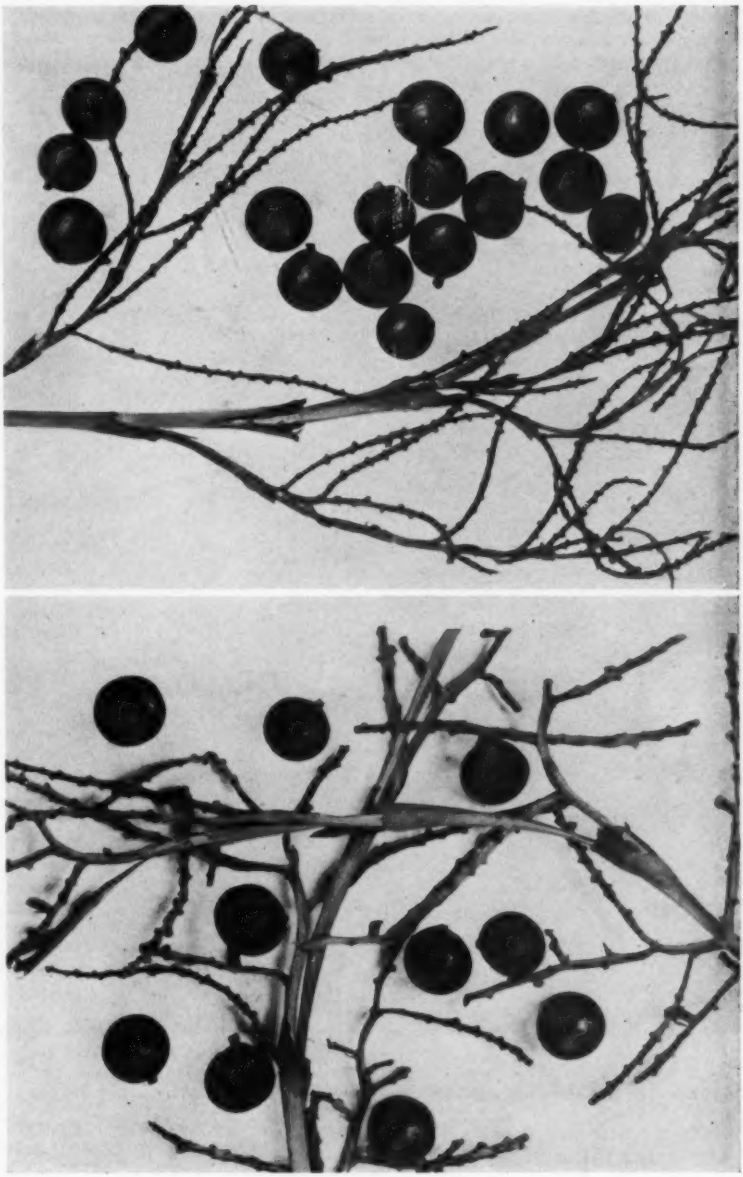
British Honduras in woods at Forest Home, *W. A. Schipp 8443; Neil Stevenson 612156*, without locality; Mountain Pine Ridge, San Augustin, in marginal forest, on limestone, *Lundell 6676*, 27 m. tall, trunk 25 cm. diameter, *Lundell 6683*, 20 m. tall, inflorescence 3 m. long.

One of the botan palms. The particular distinguishing botanical mark of this palm is the very slender floral rachillæ, sometimes almost filiform, whence the name *nematoclada*, indicating thread-like branches. It has been supposed to be the same as *S. Morrisiana*, but Fig. 218 top and bottom show the marked contrasts in rachillæ. Other distinctions are the silvery color underneath of the leaves of *S. Morrisiana*, as well as somewhat larger hastula and fruit and narrower segments with filiform ends of that species. Floral bractlets in *S. nematoclada* are sharp and prominent, but not described in *S. Morrisiana*. Other differences undoubtedly will appear when comparative studies are made in the field.

Type collection of *S. nematoclada* (Schipp 8443) I have not seen. I am obliged to base my diagnosis and pictures on other collections here cited, after having made careful study of Burret's account.

11. **Sabal Allenii,** Bailey, Gent. Herb. vi, 200 (1943); Ann. Mo. Bot. Gard. xxx, 334 (1943). Palma de Guagara. Figs. 217, 219, 220.

Erect tall tree to 20 m., trunk not very thick or heavy, prominently ringed and soon becoming bare, about 30 cm. thick at base; head or crown



218. SABAL NEMATOCLADA of British Honduras at top. SABAL MORRISIANA of northern Guatemala at bottom. Natural size. Note the marked difference between the two species in thickness and length of the rachillæ.

219. Sabal Allenii in the heavy bush on Gonzales, one of the Perlas Islands, Pacific Panama. Note the almost complete absence of palman and the hardly noticeable costa-palmate form.

very open, due to the spreading or hanging leaves, on long petioles: leaves to 2 m. across, thin or medium in texture, light glossy green on upper surface, much lighter colored underneath but not glaucous, deeply divided into 40 and more lobes without filaments between them, the points very long and narrow or even filiform, the segments or lobes perhaps 6–7 cm. broad at base and soon narrowing, with about 3 strong ribs before they divide and many fine nerves between; palman 30–40 cm. long and therefore very short for size of leaf; petiole about as long as blade or a little longer, sharp-edged, thin, shallowly concave on upper face; hastula 8–9 cm. long, narrowly long-pointed, margins upcurved: inflorescences or spadices erect or ascending, diffuse, nearly or quite equalling the leaves, much branched, rachillæ 4–10 cm. long, sheaths strongly striate and pointed: fruit glossy, brownish-black, nearly globular and short-tapering to base or pyriform and the lower part scarified or whitish, 8–10 mm. thick and about the same height, sometimes twin (two locules developing); seed small, dark brown, glossy, depressed, flattened or puckered on bottom, 5–7 cm. across, micropyle lateral, obscure, mesocarp prominent but thin.

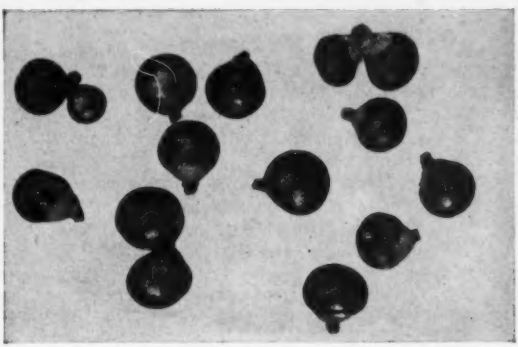
Panama: Pedro Gonzales Island, in the Perlas group, Bay of Panama, Pacific Ocean, *Paul H. Allen 2604*. Leaves used for thatch.

† 12. **Sabal bahamensis,** stat. nov. Bahaman Palmetto. Pond Top. Figs. 197, 221, 222, 225.

S. Palmetto var. *Bahamensis*, Becc. in Webbia, ii, 38 (1907).

S. Palmetto, Britt. & Millsp., Bahama Fl. 60 (1920), not Lodd.

Low tree, mostly erect but sometimes leaning, soon becoming clean of boots, trunks 6 m. or less tall, 2–3 dm. thick at base, obscurely ringed; head of old trees globular and dense, the leaf-segments stiff and most of them scarcely hanging: leaves gray-green, not glaucous (although in some lights one may detect a faint bluish cast on the foliage), filaments mostly few or sometimes none, blade to 1 m. or more across, palman 1–2 dm. long; segments to 40 and more, narrow, usually not more than 2–3 cm. broad at base, to 1 m. long, margins thick, lateral veins many and very thin, long-tapering to narrow thin ends, commonly a narrow yellow band for about 3 dm. along midrib on under side of blade; petiole about as long as blade, plano-convex and centrally ridged on upper face; hastula short, 4–7



220. Sabal Allenii. Fruits natural size; from the Perlas Islands, Panama.

or 8 cm. long, acute, margins not very conspicuous: inflorescences or spadices small, not profusely branched, shorter than the leaves, the ultimate rachillæ very slender or thin: flowers white, narrow and upstanding, not flaring, about 4 mm. long, constricted at base to form a pedicel-like attachment; calyx urceolate, only obscurely ribbed or nervate, deeply notched; petals much exceeding calyx, upstanding, very narrow, acute, not quite equalling the anthers at anthesis and about equalling the columnar pistil: fruit shining black when fully ripe, practically globose, 9–10 mm. transverse diameter; seed 6–8 mm. diameter, chocolate-brown, flattened at bottom, micropyle very small and scarcely sunken.

Low areas and rocky lands, Bahama Islands. Three numbers cited by Beccari in founding var. *Bahamensis*, collected by Eggert: *4360*, on New Providence Island, along north side to Lake Killarney, tree 16 feet high; *4114* Hog Island; *4097* Hog Island, 12–14 feet high. New Providence, *Britton & Brace 291*. Prospect Hill area, New Providence Island, *Bailey 1001*, in thick stands. Loggerhead Creek region, west side of Andros Island, *Bailey 1024*, covering acres of land on low ridges with dense forest-like growth, tallest trunks about 18 feet high. Britton and Millspaugh report palmettoes throughout the archipelago.

Palmettoes about residences, in cemeteries and public places on New Providence Ilsand, with taller trunks, larger leaves and broader segments, longer hastulas, more branched inflorescences, larger and more oblate fruits, are probably introduced species.

The Bahaman palmetto differs from the United States palmetto (*S. Palmetto*) in its smaller stature, less shag on trunks, grayish-green rather than pea-green foliage, shorter hastula, leaf-blades less filiferous, less hang of segments, shorter and simpler spadices, more stipitate flowers, rounder fruit and smaller seeds; the trees have a different look.

† 13. **Sabal yucatanica,** spec. nov. Figs. 209, 223.

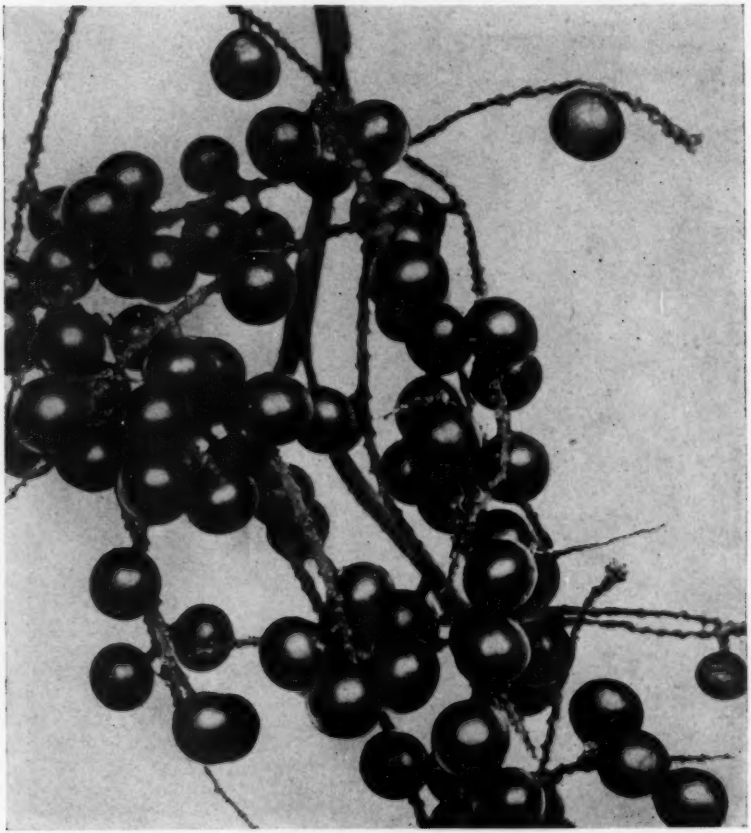
Arbor ad 20 m. alta, truncus 2–3 dm. diam.: folia magna, rigida, concolora, costapalmata, 1 m. vel plus lata; segmenta multa, erecta, 3–4 cm. lata prope basim, costa media prominens, venæ laterales multæ tenuesque, apices longi angustique sed non graciles, sinus non filiferi; hastula brevis, acuminata, margines sæpe incurvi, 8–9 cm. longi, 4–5 cm. lati: infructescentia multo excedens folia, rami breves validique; rachillæ 3–9 cm. longæ, 1.5–2 mm. crassæ cum maturæ; fructus niger, globularis, 12–13 mm. diam., pulposus; semen 8–9 mm. latum, nitido-brunneum, liberum in crasso mesocarpio, micropyla parva, superlateralis vel pæne apicalis.

Tree 6–20 m. tall, trunk 2–3 dm. diameter: leaves large and stiff, 1 m. and more across, costapalmate, practically the same green color on both surfaces, non-filiferous in the sinuses; segments erect, close together, 3–4 cm. across, many, very firm in texture, midrib prominent and elevated on upper surface, lateral nerves many and little noticeable except under a lens, cross-lines many but very obscure, tapering into narrow but not filiform or drooping apices, palman large; hastula relatively short and broad unless

221. SABAL BAHAMENSIS on Andros Island, Bahamas. A low tree with grayish-green foliage, rigid segments, few filaments on leaves, nearly or quite simple inflorescences, globular fruit and small seeds, stipitate flowers.

when the margins are strongly inrolled, about 8 or 9 cm. long and perhaps 4–5 cm. broad when expanded, the segment bases stoutly plaited against it: infructescence stout, much exceeding leaves, with short branches and rachillæ; flowers not seen: fruit shining, black, globular, 12–13 mm. across, only indifferently if at all narrowed to base; rachillæ 3–9 cm. long, 1.5–2 mm. thick when dry; seed large, 8–9 mm. across, dark glossy brown, pulpy when fresh and eaten by birds, free in firm mesocarp that becomes hard when dry, micropyle small and inconspicuous, superlateral to mid-apical.

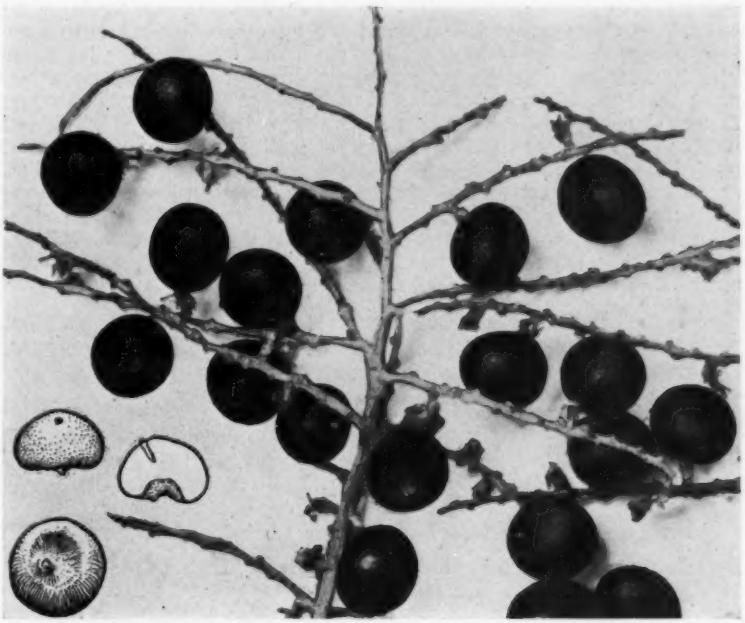
Yucatan peninsula, Mexico, known as "huano" and "xaan," C. L. and



222. Sabal bahamensis. Fruit about natural size, nearly globular. Photographed fresh from the tree.

Amelia A. Lundell: Chichen Itza, Yucatan, in yard of the hacienda, native in the area, *Lundell 7368* (type); Quintana Roo at Coba, bordering Lake Macanxac, *Lundell 7727*.

This palmetto differs from *S. mexicana* in the non-filiferous leaves, segments not filiform or drooping at apex, more rigid and compactly placed segments, shorter hastula, shorter and stouter rachillæ, smaller and rounder fruits. From *S. parviflora* it differs in its erect and not thread-like segment-tips, lack of filaments in the sinuses, shorter and usually broader hastula, longer infructescences, fruits more uniformly rounded, rachillæ commonly stouter. From *S. bahamensis* it is separated by its more rigid segments, strongly margined hastula, longer infructescences, stouter rachillæ, larger fruits. From *S. jamaicensis* it differs in its more rigid less filiformly tipped leaf-segments and its more uniform and rounder not lop-sided fruit as well as stouter rachillæ and broader and relatively shorter hastula and more projected infructescence. It separates from *S. Yapa* by the large palman, erect more rigid leaf-segments, broader or more marginate hastula, shorter



223. SABAL YUCATANICA. Fruits natural size. Observe the thick stiff rachillæ. At lower left, the seeds, side and bottom views, micropyle showing near top; section, disclosing embryo.

thicker rachillæ, larger rounder and more pulpy fruit, apparently taller and heavier tree.

This palmetto, *S. yucatanica*, is undoubtedly the *Inodes japa* of Standley in his Flora of Yucatan, 219 (1930), with the vernaculars "xaan" and "xan." He states it is "very common in dry forests, flowering throughout the year."

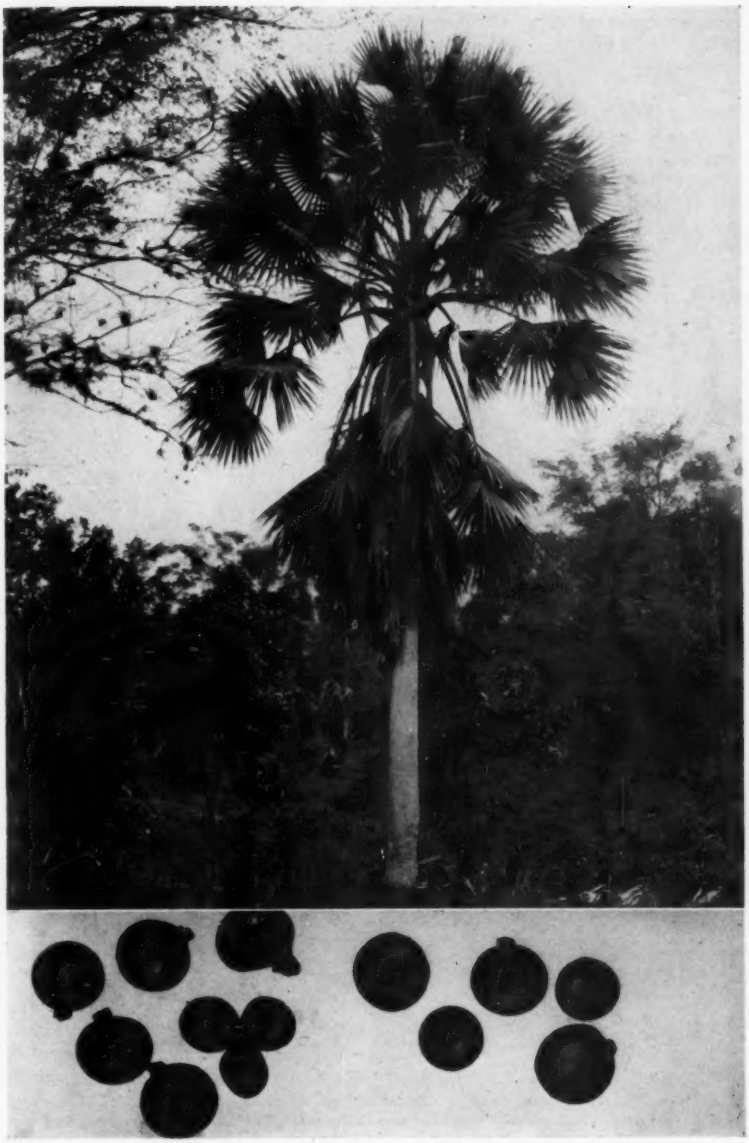
14. **Sabal jamaicensis,** Becc. in Fedde, Repert. vi, 94 (1909). JAMAICAN PALMETTO. BULL THATCH. Figs. 197, 224, 225.

Erect tree with stout stocky usually bare trunk to about 13 m. tall but often much less than that; head or crown globular but not very dense, the long petioles giving it an open look, many of the leaves declined before final collapse: leaf-blade green, 1 m. or more across, palman 9 dm. or more long, the continuing rib strongly decurved, either not filiferous or only moderately so; segments 80 or more on full grown leaves, very firm or almost stiff, to 1 m. long, the main central ones 6 cm. broad toward base, long-pointed and bifid, with many nerves either side the costa; petiole 1–2 m. long, often exceeding length of blade, shallowly concave on upper surface and also somewhat ribbed at the center; hastula long-acuminate, to 6 dm. long, the thin margins upturned and sometimes inrolled, or in some cases recurved: inflorescences or spadices about equalling the leaves or slightly exceeding them but not prominently projected, sometimes shorter, much branched, ultimate branches or rachillæ 3–8 cm. long and glabrous: flowers closely placed, sessile, 4–5 mm. long; calyx flaring, notched, not striate; petals much exceeding calyx and pistil, upstanding, narrow and semi-acute, not striate, the anthers at anthesis showing prominently just above them: fruit depressed-globular but with a more or less tapered base, 11–13 mm. transverse diameter and 9–11 mm. high not counting the stipe-like projection at base, dark dull brown (becoming black?); seed much depressed, flat on bottom, 8–10 mm. across, about 6 mm. high, shining dark brown, micropyle very small and sometimes supralateral.

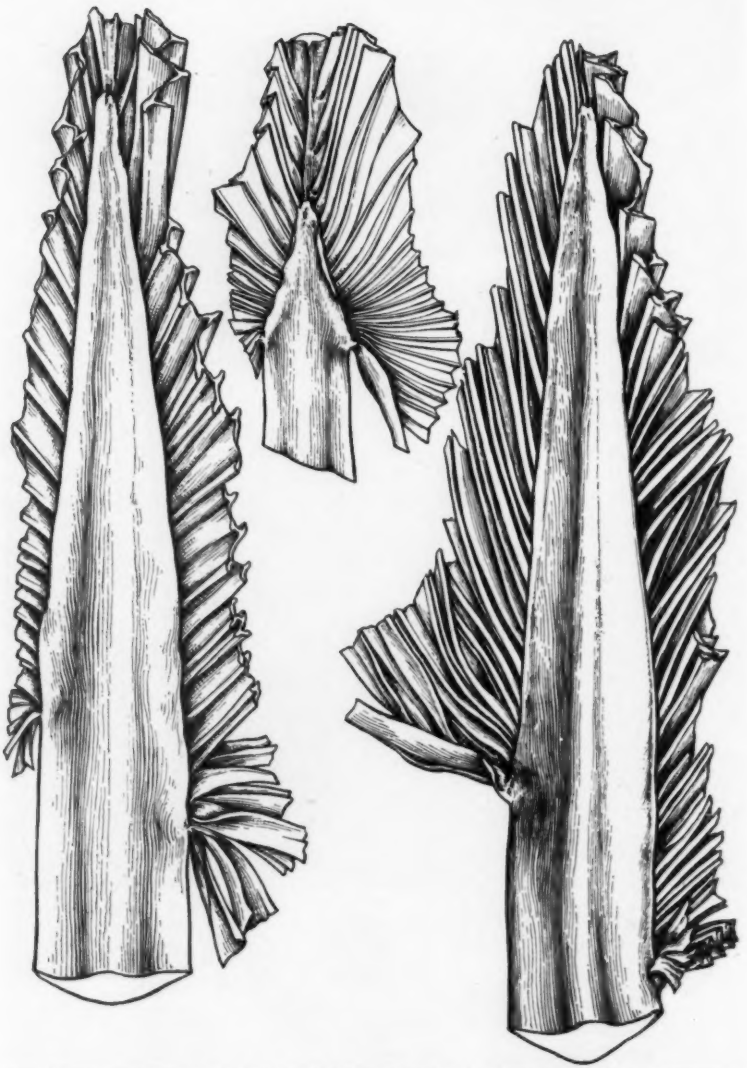
Jamaica, British West Indies, on dry lands, bluffs, ridges, marginal lands, frequent. Type station, Pedro Bluff, St. Elizabeth, *Harris 9736*. Ipswich, St. Elizabeth, *Bailey 15047*; Lacovia, St. Elizabeth, *Bailey 210*; Little London, Westmoreland, *Bailey 299*; Alligator Pond, Manchester, *Bailey 15079*; Port Royal Mountains, St. Andrew, *Bailey 15087*; Castleton Gardens, St. Mary, *Bailey 15030*, apparently planted; Kingston, *Bailey 201*, planted.

† 15. **Sabal Questeliana,** spec. nov. Figs. 225, 226, 227.

Valida erectaque arbor, plus quam 10 m. alta, truncus 40 cm. diam.: folia maxima, 1 m. vel plus lata, rigida, costapalmata, palman magna, lætevirens vel albido-virens subter, filamenta multa in sinubus; segmenta 3–4 cm. lata, apices filiformes et pendentes; petiolus æquans vel excedens laminam; hastula longo-acuminata, 25–30 cm. longa: spadices probabiliter non excedentes folia, 2.5 m. longi, multi-ramosi; rachillæ gracillimæ, 1 mm.



224. SABAL JAMAICENSIS in the wild in St. Elizabeth, Jamaica. Fruit natural size, variable, one of them with the three carpels developed.



225. SABAL JAMAICENSIS at left, hastula from the wild in Jamaica. SABAL BAHAMENSIS, New Providence Island, Bahamas, in center. SABAL QUESTELIANA at right, from St. Bartholomew, French West Indies. All about one-half natural size.

vel minus crassæ cum siccæ: fructus minimus, brevi-pyriformis, circa 8 mm. diam., 10–12 mm. altus cum basi; semen 5 mm. diam., micropyla minuta.

Stocky heavy tree of medium height, more than 10 m., with columnar trunk 40 cm. diameter that soon becomes bare and irregularly ringed: leaves very large, 1 m. and more across, strongly costapalmate and palman large, dull on upper surface, light green or whitish-green on under surface, texture stiff, filaments many in the sinuses; segments narrow, 3–4 cm. broad at middle or base, produced into very long filiform hanging ends, midrib prominent but side-veins inconspicuous, cross-lines many but indistinct; petiole equalling or exceeding blade, about 5 cm. wide at apex, shallowly concave and somewhat centrally ridged on upper surface; hastula long-acuminate and extended, 25–30 cm. in length, the margins little elevated; rachis strongly continuing through blade: inflorescences or spadices probably not exceeding leaves, 2.5 m. long, much branched, in individual clusters 20–30 cm. long; rachillæ very slender, 1 mm. or less thick when dry, terete, not densely flowered; flowers not available: fruit very small, short-pyriform with rounded top, about 8 mm. diameter and 10–12 mm. high with stalk; seed about 5 mm. across, loosely contained in a thin papery mesocarp, micropyle minute.

St. Bartholomew (St. Barts), French West Indies, where it is much cultivated for the materials it supplies, said to have been introduced more than fifty years ago from the Turks Islands in the southern Bahamas but whether native to those islands is not determined; collected for me by my friend and correspondent, M. Adrien Questel, now of Guadeloupe but who was born on St. Barts.

Size of the fruits in this palmetto is unusually small. M. Questel said in one sending that the fruits were small because of drought, but those received in 1938, 1939 and 1940 are practically the same. All the many fruits received by me retain their uniform shape, not shrivelled, rich brown in color, and glossy as if fully ripe. Aside from the fruits, *S. Questeliana* is known by the stout columnar trunk, obviously costapalmate leaves that are whitish-green underneath, narrow segments thread-like at the end, extremely long hastula, very thin rachillæ.

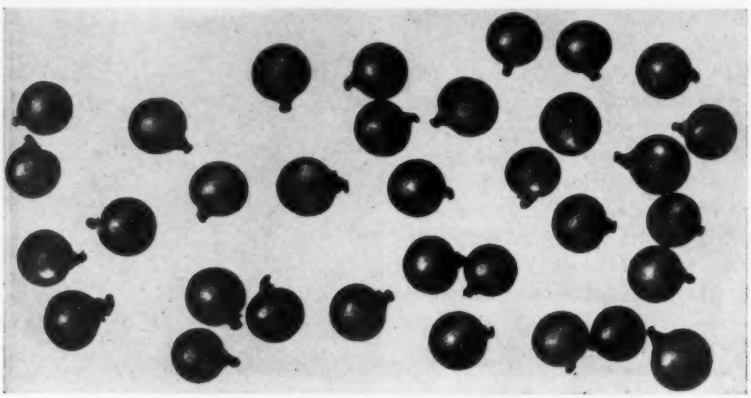
226. Sabal Questeliana, on island of St. Bartholomew, French West Indies.

16. **Sabal causiarum,** Becc. in Webbia, ii, 71 (1907); Britt. & Wils. Bot. Porto Rico and Virg. Isl. i, 116 (1923); Bailey Gent. Herb. iii, 315 (1934). Hat Palm of Puerto Rico. Palma de Sombrero. Figs. 216, 228, 229.

Inodes causiarum, O. F. Cook, in Bull. Torr. Bot. Club, xxviii, 531 (1901); Contrib. U. S. Nat. Herb. viii, pt. ii, 167 (1903); Urban, Fl. Portoricensis, 127, 154, in Symb. Antill. iv (1903).

Inodes glauca, Dammer, in Urban, op. cit. 127.

Columnar heavy tree but usually not very tall, 10–16 m. high, trunk soon becoming nude and presenting a gray smooth look, not swollen at intervals but often constricted at very base, to 2 m. or more in girth, obscurely ringed: head large, globular in outline but with a thin open look because of the long petioles, leaf-segments spreading but commonly not hanging, spadices long-projecting: leaves strongly costapalmate, very large, usually 1.5–2 m. across either way, commonly bright green but sometimes glaucous-blue (whence the name *glauca*), palman about one-third length of blade, sinuses conspicuously filiferous; segments 50–60 or more, usually 1 m. and more long, 3–5 cm. broad at base, firm or stiff in texture, finely parallel-veined, produced into long slender sometimes filiform ends, mostly standing outwardly on the tree but in some cases more or less drooping; petiole 1 m. and more long, obtusely convex on under side, shallowly concave on upper face and obscurely ridged toward the blade, base expanded and bearing many fibers and shreds and even foliaceous extensions; hastula long and taper-pointed, 15–20 cm. in length, margins often prominently upturned: inflorescences very long, commonly extending markedly beyond the leaves, sheaths sharply pointed, ultimate rachillæ slender and short, 3–8 cm. long, glabrous: flowers white, slightly fragrant, sessile, about 4 mm. long at full anthesis and petals more or less spreading;



227. Sabal Questeliana. Fruits, natural size.

calyx short and cup-like, somewhat ribbed when dry, toothed nearly one-half its depth; petals narrow, acute, nearly equalling the short-oblong anthers at anthesis and considerably exceeding the short stout pistil: fruit globose-pyriform, asymmetrical, dark brown to nearly black, 10–13 mm. thick and nearly as high; seed depressed, 8–10 mm. across, dark glossy brown, micropyle very small and supralateral.

Puerto Rico, on coastal plains and in lower valleys and on slopes, often making close and extensive colonies. Leaves are cured, bleached and

228. SABAL CAUSIARUM at Borinquen, Puerto Rico. Note the extended inflorescences and columnar trunk.

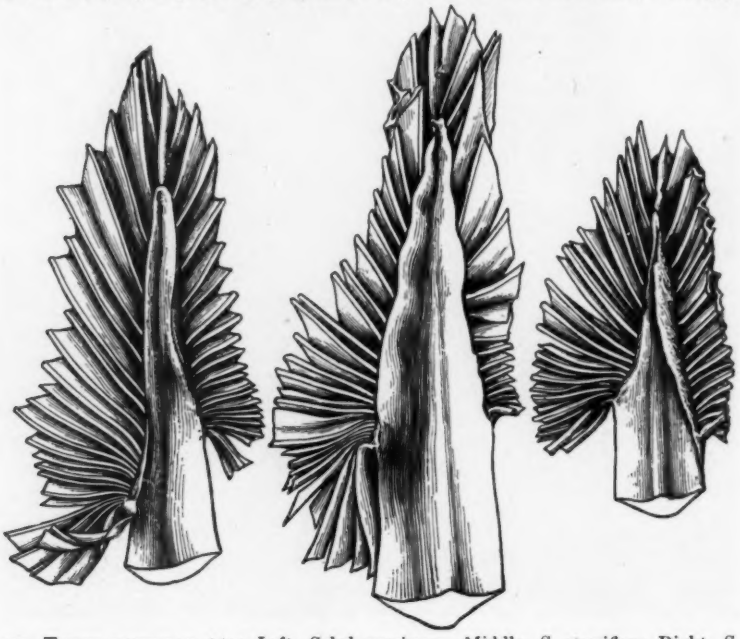
shredded and employed extensively for the making of hats (Latin *causia*, a white hat) as well as for mats, baskets and other articles. Assignment of this species to Haiti is probably an error, unless when the palm may have been introduced there. Isabella, Aguadilla, *E. E. Barker;* Punta Borinquén, Aguadilla, *Bailey 46, 328;* Guanajibo, Mayaguez, *Bailey 18;* Penuelas, Ponce, *Bailey 43.* Harvard Botanical Garden, Soledad, Santa Clara, Cuba, *Bailey 12485,* planted.

17. **Sabal parviflora,** Becc. in Webbia, ii, 43 (1907), and Pomona Coll. Journ. Econ. Bot. ii, 375 (1912); Bailey, Gent. Herb. iii, 369 (1934). CUBAN PALMETTO. PALMA CANA. GUANO CANA. Figs. 229, 230.

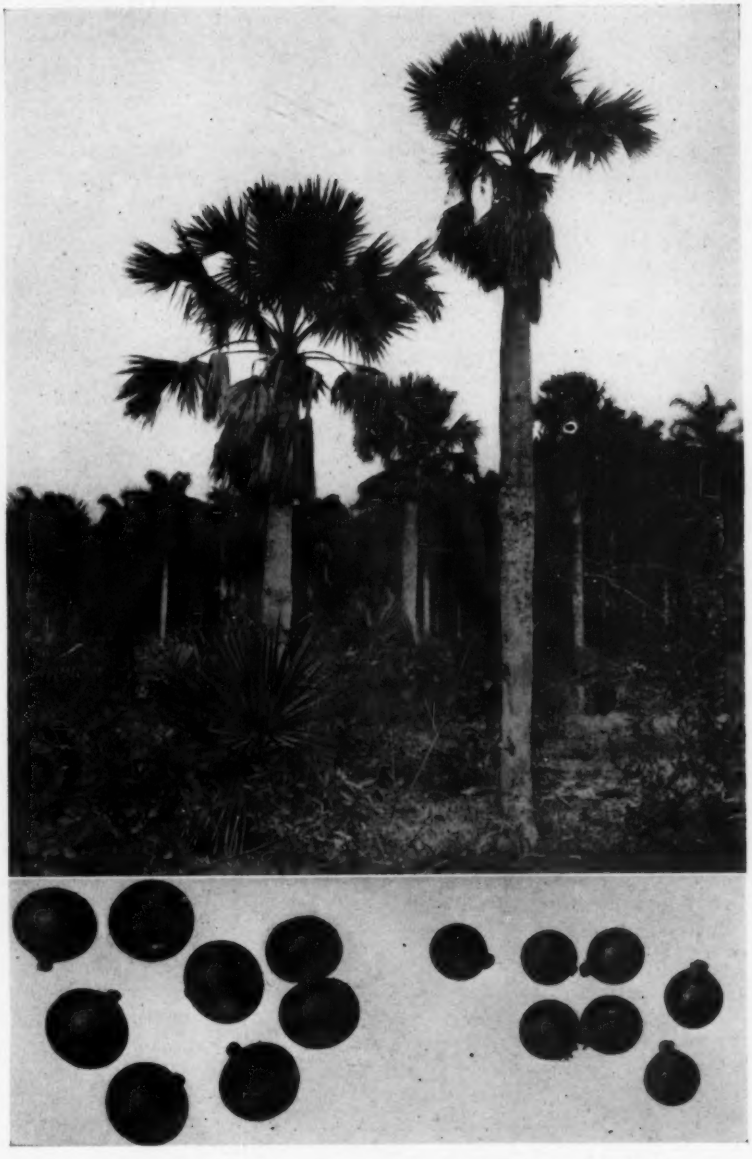
S. mexicana, Martius?, Sauvalle, Fl. Cubana, 152 (1873).

S. florida, Becc. op. cit. 46.

Tall erect usually stout tree to 16 m. or more tall, trunk commonly columnar, often bulged or irregularly swollen, usually self-cleaning and light colored; head globular and dense, the petioles mostly not greatly extended: leaves stiff, light green or grayish-green, 1 m. and more across, strongly



229. THREE HASTULAS, ×⅓. Left, *Sabal causiarum.* Middle, *S. parviflora.* Right, *S. Palmetto.*



230. SABAL PARVIFLORA from Batabanó, western Cuba. Fruit natural size, from two trees, showing variation.

downward-curving, segments more or less rigid and seldom hanging prone, palman relatively small and often not more than one-fourth length of blade, very filiferous on most trees; segments very many, relatively narrow, seldom exceeding 4–5 cm. broad at base and usually much less, 1 m. long more or less, split or 2-lobed often as much as 12–14 cm. or more, the points long and narrow and some of them thread-like, midrib very strong on under face, side-veins many and faint and lower face sometimes indistinctly cross-lined: inflorescences or spadices shorter than leaves or equalling them, 1–2 m. long, much branched, rachillæ 6–15 cm. long, glabrous, sheaths conspicuously pointed: flowers rather compactly or contiguously placed, differing in length on different trees and sometimes elongating in anthesis, 3–5 mm. long, sessile or essentially so; calyx cup-shaped, acutely toothed, only faintly or not at all striate; petals much exceeding the calyx, erect, narrow, acute, usually slightly exceeded at anthesis by the short-oblong anthers, much exceeding the stout pistil: fruit black or brown-black at maturity, globular to globular-pyriform, often asymmetrical, 9–15 mm. across, varying in size and shape; seed 8–11 mm. across, contained in a fibrous mesocarp, much depressed, 7–11 mm. across, lucid chocolate-brown, micropyle very small.

Cuba, on differing terrains, commonly on lower lands, Isle of Pines, Pinar del Rio, Habana, Matanzas, Santa Clara, Camaguey, probably Oriente.

Thus far we are able to recognize only two species of Sabal on Cuba, *S. parviflora* and *S. Yapa*. There may be others but this cannot be determined until much more complete material is assembled. Pieces of detached leaf-segments may look very different, yet one is prepared, from experience with other palmettoes, to question whether they might not have grown on the same leaf or at least on the same tree. Beccari separated *S. parviflora* and *S. florida* primarily on size of flowers and denseness of florescence on rachillæ; these distinctions do not hold, and it is a question whether *S. florida* can be applied to a new Cuban species if a second one is distinguished. Beccari did not know fruit of *S. florida*, so that the full character is not recorded. He based this species on a collection by Robert Combs No. 292, from Cieneguita, Santa Clara; *S. parviflora* was founded on Charles Wright No. 3970 from the Isle of Pines, but referred to it was Curtiss No. 484 from Isle of Pines, and Wilson No. 2308 from Batabanó, Province of Habana.

At Gamboa, in the southwestern part of Province Oriente, Cuba, where I had gone to see the heavy palm *Copernicia gigas*, I met also with a great columnar Sabal. It was in March, and the palmetto was not in flower or fruit, but my leaf specimens and photograph suggest an extreme form of *S. parviflora* or an undescribed species. The leaves (No. 15158) are thick and stiff and gray, practically without filaments, segments 4–5 cm. broad and ends not long-slender, hastula 18–20 cm. long and with a broad upturned margin, petiole about 10 cm. broad at its middle and 24 cm. across

231. SABAL PALMETTO. The well-known palmetto of the eastern United States, native from the islands in southern North Carolina to the keys of southern Florida and to Bay County in the northwestern part of that state. This picture is from Gulf County, Florida, the Gulf of Mexico in the distance. Clumps of *Serenoa repens* in the background.

at base; remains of an old frutescence had an axis 2–3 cm. thick, nodifronds very large and long-pointed. Perhaps some wandering botanist may be interested to collect this striking palmetto at the proper season.

Seeds collected in Province Camaguey, Cuba, about 1902, by the late P. H. Rolfs, have produced trees that grew on the former property, Palmhurst, at 182 N. E. 49th St., Miami, Florida, and are now growing on the Experiment Station grounds at Gainesville under the name *Sabal causiarum*. All these trees are *S. parviflora* or the eastward extension of that species that I got at Gamboa (15158) in Oriente and mentioned in the preceding paragraph.

18. **Sabal Palmetto,** Lodd. ex Schultes & Schultes, Syst. Veg. vii, pt. ii, 1487 (1830); Martius, Hist. Nat. Palm. iii, 247 (1837–8). COMMON PALMETTO of United States. Figs. 187, 189, 197, 229, 231, 232.

Corypha Palmetto, Walt. Fl. Car. 119 (1788).

Corypha Palma, Wm. Bartram, Travels, 61 (1791).

Chamærops Palmetto, Michx. Fl. Bor.-Amer. i, 206 (1803).

Inodes Palmetto, O. F. Cook, in Bull. Torr. Bot. Club, xxviii, 532 (1901).

Inodes Schwarzii, O. F. Cook, l. c.

Sabal Schwarzii, Becc. in Webbia, ii, 39 (1907).

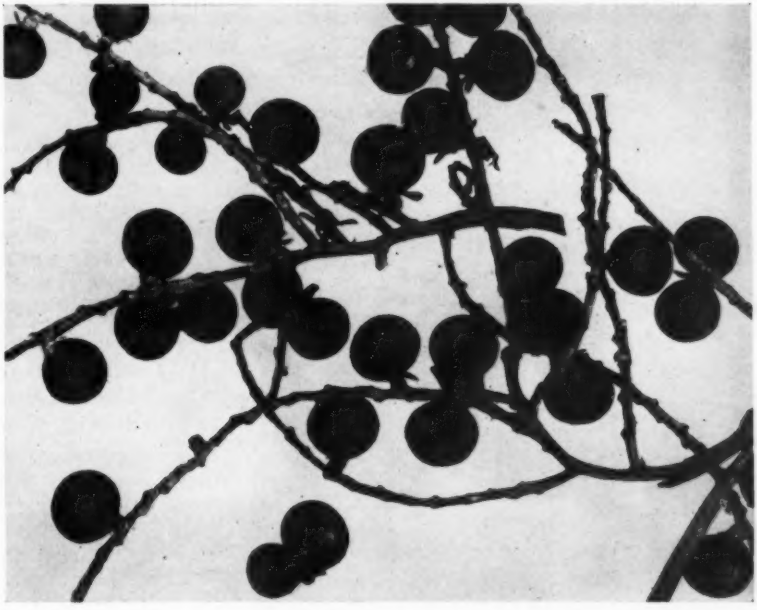
Sabal Jamesiana, Small, in Journ. N. Y. Bot. Gard. xxviii, 182 (1927).

Tree of various statures depending on conditions not yet understood as well as on age and fertility of land, often bearing fruit when the trunk is a meter or less tall or even before it is much emerged, sometimes in maximum growth reaching nearly 30 m. (90 feet, Sargent), the old trunks usually exfoliating beneath the head and leaving a rough commonly not entirely straight nor rigidly erect bole 6 dm. in thickness, ordinarily with simple trunk but rarely forked or branched presumably from death of terminal bud; head or crown globular in old or tall trees, diffuse when young, the criss-cross of expanded petiole-bases often conspicuous for years, the long slender segments hanging or drooping conspicuously, color green rather than glaucous: leaves with blade 1–2 m. long and usually somewhat broader, prevailingly strongly costapalmate and curved the entire length, but in some cases of arrested development (*S. Jamesiana*) remaining more or less palmate, abundantly filiferous in sinuses; segments 60 or more on strong leaves, 5–8 dm. long beyond the palman, 3–4 cm. broad at base, split about one-third the length into 2 very narrow attenuate lobes; petiole ordinarily longer than the blade, plano-concave on upper surface and sometimes ridged in middle toward upper end, base much expanding and splitting with age; hastula 10 or 12 cm. long, gradually narrow-acuminate, edges upstanding or sometimes inrolled: inflorescences interfoliar, slender and compound, commonly conspicuously exceeding the leaves, the branches

4–5 dm. or more long, rachillæ glabrous, the many nodifronds long-acuminate: flowers multitudinous in the large inflorescences or spadices, stramineous, sessile, about 5 mm. long, subtended by a bract; calyx columnar, shallowly 3-notched; petals exceeding calyx but not equalling anthers at prime anthesis; columnar undivided pistil prominent: fruit variable in size and shape, commonly shining black at full maturity, usually globular with somewhat tapering base and 9 or 10 mm. in transverse diameter, but ranging from 7–12 mm. thick, shell thin, mesocarp scant and seed free; seed depressed, about 6–8 mm. across, shining dark brown when fully ripe, micropyle lateral and prominent.

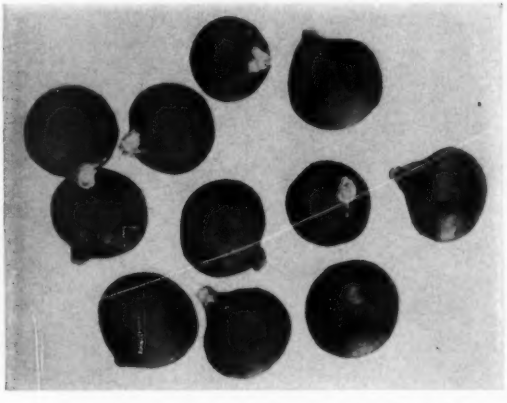
Southeastern North Carolina on Smith's and Middle Islands at Cape Fear, coastal regions of South Carolina and Georgia, length and breadth of peninsular Florida and westward in that state to St. Andrews Bay in Bay County on the mainland, usually in lowlands but also in dry and sandy areas and on coastal dunes, a characteristic and notably variable tree.

Sometimes *S. Palmetto* looks like an acaulescent palm, even when bearing fruit. In some cases the plant long retains its juvenile palmate foliar character, even among other trees of costapalmate foliage. Thus, the



232. Sabal Palmetto. Fruits from native tree on Cudjoe Key, southern Florida; natural size. Two carpels are seen at bottom, one of them not full developing.

original tree of *Sabal Jamesiana* had a flat palmate leaf and short segments, even though the midrib was "prolonged far into the leaf-blade," as seen in Small's picture of the palm in Journal of the New York Botanical Garden, published in 1927; in 1934 I visited this tree under guidance of the late Charles A. Mosier, who was with Small at the discovery, and found it producing fairly typical costa-palmate leaves with very long drooping segments, the tree having grown taller. I have photographs of these leaves and also herbarium specimens.



233. SABAL BECCARIANA as grown at Palermo, island of Sicily, Italy. Fruits, natural size.

19. **Sabal Beccariana,** Bailey, Gent. Herb. iv, 387 (1940). Fig. 233.

S. princeps, Hort. apud Becc. in Webbia, ii, 59 (1907), not auth; Bailey, Gent. Herb. iii, 328 (1934).

Large apparently tall tree making thick trunk covered with bases of broken petioles; head open because of the very long petioles and hanging leaf-segments: leaves 1.5 m. and more long and broad aside from petiole, rachis ex-

tending about one-half length of blade, palman comprising about one-half or less length of blade; segments about 100, green on both surfaces, 4–6 cm. broad at base, long and narrowly pointed and hanging prone; petiole equalling or exceeding the blade, strongly convex on under face and lightly concave on upper face with a central ridge, hastula elongated-triangular: inflorescences or spadices about 2 m. long, much branched, usually not exceeding the leaves and hanging in fruit, ultimate rachillæ 6–13 cm. long, angled when dry, gray, rather closely flowered; calyx and corolla costulate: fruit short-pyriform, the base rather abruptly tapering, 15–16 mm. broad when fresh and about as high, dark gray (perhaps becoming black), white at the point from the persistent accrescent calyx; seed free in the pericarp, not imbedded in a mesocarp, chocolate-brown, 9–10 mm. across, 5–6 mm. thick, micropyle prominent and lateral.

Nativity unknown. Beccari described "Sabal princeps Hort." from a tree so named in the Botanic Garden at Palermo in Sicily, and from which Sig. L. Montemartini sent me materials and photographs. The name *princeps* is a floating nomen in horticultural lists, with applications long previous to the Beccari palm here described, and it should not be continued as a taxonomic binomial.

20. **Sabal bermudana,** Bailey, Gent. Herb. iii, 326 (1934). Figs. 197, 234, 235, 236.

S. Blackburniana, Hemsl. in Rept. Voy. Challenger, Bot. i, 70 (1888) not *S. Blackburnia,* Glazebrook; see *S. umbraculifera,* No. 21.

Stocky palm but not very tall, 10–13 m. high, trunk erect or oblique at base, soon cleaning itself but dead or broken leaves often hanging, bole coarsely but obscurely ringed, head open or loose because of the long spreading or declined petioles: leaves bright green, lighter colored underneath, blade 2–3 m. across, palman 30 cm. or more long and prominently fluted and perhaps parted nearly to base on sides, filaments few or none; segments 60 or more, 4–5 cm. broad at base, 60 cm. and more long, the long ends very narrow but not caudate-filiform, midrib prominent but lateral veins inconspicuous; petiole 1 m. and more long, equalling or exceeding the blade, not very broad, concave with narrow margins on upper face; hastula narrow and pointed, 8–12 cm. long, with thin upstanding margins: inflorescences or spadices 1–2 m. long, much branched, commonly not exceeding the leaves and hanging in fruit, loose sheaths or spathelets prominently pointed and very finely nerved, rachillæ 6–10 cm. long and terete: flowers about 4 mm. long, sessile, subtended by acute bracts, calyx long and very deeply lobed and one-half or more the length of the acute petals that are spreading at full anthesis and equalling or a little shorter than anthers, pistil prominent: fruit large, black, short-pyriform with a contracted base, asymmetrical, 16–18 mm. broad and of similar height; seed depressed-globose, contained in a thick mesocarp that is hard when dry, shining chocolate-brown, irregular, 10–14 mm. broad and 7–9 or 10 mm. thick, micropyle midlateral, small but prominent.

234. Sabal bermudana as it grows in Paget Marsh, Bermuda. The trunk is somewhat leaning. Nephrolepis fern grows in the axils of old persisting petioles. Fruit-clusters do not equal the leaves.

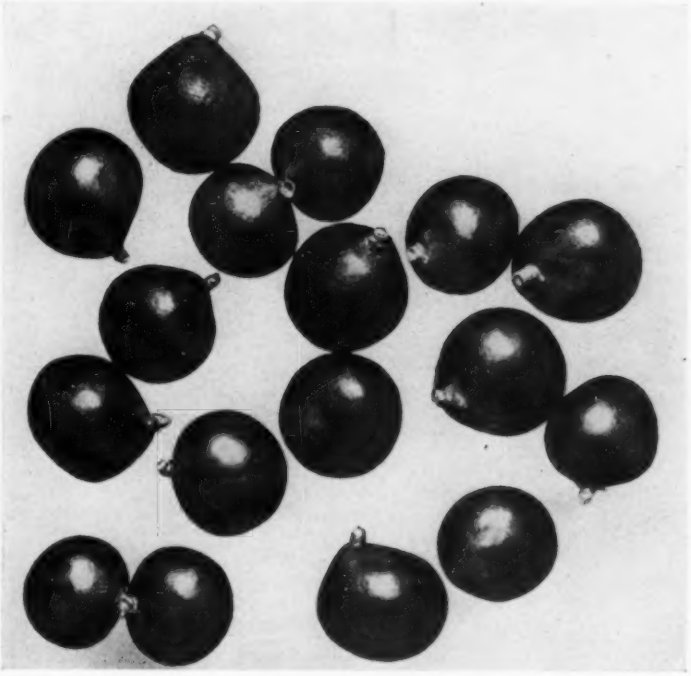
Bermuda, where it is widespread. Paget Marsh, near Hamilton, *Bailey 73, J. C. Nauen, H. H. Whetzel;* along north shore, *J. C. Nauen.* "In the writer's opinion, the palmetto is, next to the cedar, the most valuable and interesting of our native plants," Bermuda Department of Agriculture. This palmetto yields supplies for household use.

21. **Sabal umbraculifera,** Martius, Hist. Nat. Palm. iii, 245, t. 130 (1838), and i, t. Y figs. 5, 6, 7; Bailey, Gent. Herb. iv, 272 (1939). HISPANIOLAN PALMETTO. Figs. 186, 236, 237.

Corypha umbraculifera, Jacq. Fragm. Bot. 121 (1800–1809), apud Martius.

Sabal Blackburnia, Glazebrook, in Loudon's Gardeners Mag. v, 52 (1829); see *S. bermudana*, No. 20.

Inodes Blackburniana, O. F. Cook, in Bull. Torr. Bot. Club, xxviii, 531 (1901).



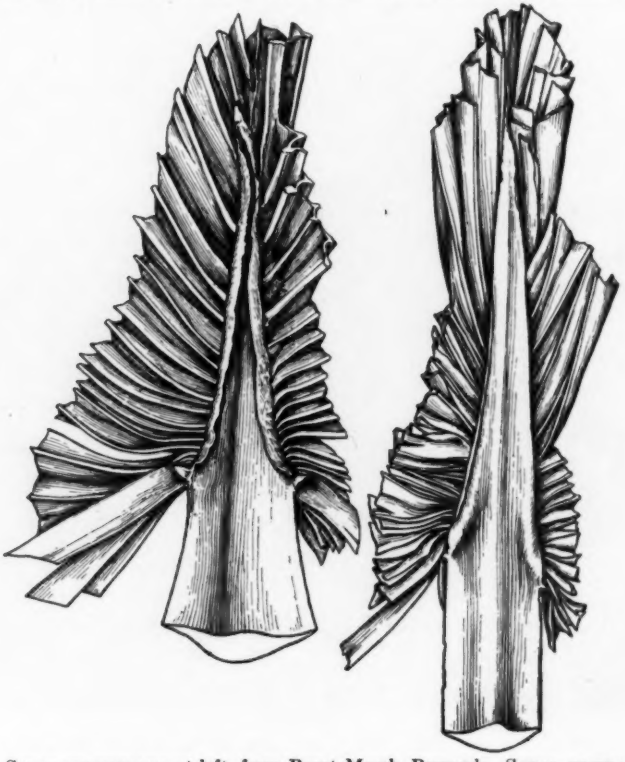
235. SABAL BERMUDANA, fruit full size. Note the more or less pyriform shape. At lower left, two of the three carpels have developed.

Sabal neglecta, Becc. in Webbia, ii, 40 (1907); Ann. Roy. Bot. Gard. Calcutta, xiii, 292, t. 18 fig. E and t. 36 fig. 3 (1931).

Sabal domingensis, Becc. op. cit. 49; 293, t. 18 fig. F and t. 35 fig. 6.

Sabal haitensis, Becc. in Ann. Roy. Bot. Gard. Calcutta, xiii, 293, t. 20 fig. B (1931).

Great columnar very fructiferous tree to 20 m. tall (perhaps more), probably the most massive of the palmettoes, ordinarily straight but sometimes bent from contingencies now passed away, the cement-like nude bole of old trees as imposing as that of a royal palm; head more or less rounded, usually not dense and sometimes open because of the long petioles and the hanging position, lower part often bearing a canopy of shag much like that of Washingtonia: leaves commonly grayish-green, sometimes bluish but only mildly glaucous, strongly costapalmate, upper ones ascending, middle



236. SABAL BERMUDANA at left, from Paget Marsh, Bermuda. SABAL UMBRACULIFERA at right, from Santo Domingo. × about ½.

ones more or less horizontal, lower ones declined and then hanging for a time when dead, blade often 2 m. long, palman nearly one-half its length, filaments in the sinuses usually scant or none but sometimes evident; segments 1 m. long, 3–5 cm. broad at base, stiff in texture, midrib conspicuous underneath, lateral veins many and very slender, surface finely cross-hatched under a lens, most of the segments produced into long narrow ends; petiole often nearly or quite 2 m. long, roundly convex underneath, shallowly concave and toward the top indifferently ridged on upper face, base ragged with shreds; hastula moderately long and long-pointed, margins upstanding but ordinarily not inrolled, 12–15 cm. long: inflorescences or spadices shorter than leaves and likely to be hidden within the head, compound, abundantly flowered, rachillæ strong and terete, 9–15 cm. long, spathelets or minor sheaths acuminate and lengthwise striate, when in full fruit the cluster hanging and perhaps 1 m. long: flowers contiguous on the rachis but not glomerate, sessile, small, about 4 mm. long; calyx striate and toothed nearly half way down; petals narrow and nearly acute, upstanding or spreading, the short-oblong anthers conspicuous just above them at

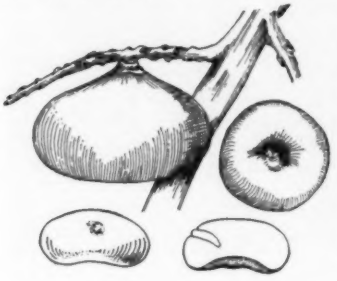
237. SABAL UMBRACULIFERA from Haiti; photographed when fresh from the tree. Natural size; note the different sizes in the same cluster; dry fruits from separate trees are likely to vary from 13 to 20 mm. in transverse diameter.

prime anthesis, style nearly equalling the corolla: fruit globular-pyriform to somewhat oblate, usually abundantly produced, brown-black at maturity, 13–20 mm. across and nearly or quite as high, sometimes a little smaller than 13 mm. but seed not likely to be fully developed; seed chocolate-brown, about 9 mm. across, flattened on base, rounded on top, micropyle very small, supralateral.

Hispaniola, common on uplands in both Santo Domingo and Haiti. "Valde communis per totam insulam dispersa," Catalogus Floræ Domingensis, 64 (1943), by Moscoso, who admits no other native species unless *S. causiarum* in Sud, Haiti. "There seems to be only one species of Sabal in Haiti," Ekman in Archiv för Botanik, xxii, häfte 2, 15 (1929). Burret does not report a Sabal from Hispaniola in his Palmæ Cubenses et Domingenses a Cl. E. L. Ekman (Kungl. Svensk. Vetensk. Akad. Handl. ser. iii, vi, 1929). My reasons for adopting the name *Sabal umbraculifera* (umbrella-bearing) for the Hispaniolan palmetto are sufficiently stated in Gentes Herbarum, iv, 271.

Santo Domingo: Azua, *Rose, Fitch & Russell 4058;* Moca, Province Espaillat, *Bailey 238;* Gurabo, Province Santiago, *Bailey 236, 237;* near Santiago, *Bailey 313, 314;* near La Vega, *Bailey 240;* near Bani, Province Santo Domingo, *Bailey 244.* Haiti: near Poteau (Gonaives), Department Artibonite, *Bailey 145,* and Ennery, *Bailey 147;* Passe Reine, *Bailey 165;* Terrier Rouge, Nord, *Bailey 304;* Sarcy, *Bailey 318;* Les Cayes, Sud, *Bailey 291;* Habitation Tombeau, Ouest, *Bailey 298.*

This palm, *S. umbraculifera,* the most stately of the palmettoes, is confused as to its title. History of its botanical status was reviewed by me in my Sabal monograph (Gent. Herb. iii, 312–313) and in my account of the Hispaniolan palmetto in Gentes Herbarum, iv, 271–275. Martius in 1838 referred Glazebrook's *S. Blackburniana* to it, a disposition apparently not approved by subsequent authors but which I am now ready to accept, for the purposes of this paper. I had already suggested the identity of the two in my second paper with the statement that *S. Blackburnia* (I have not adopted the longer form *Blackburniana:* Gent. Herb. iii, 330) with the later indication that it might then be the tenable name. The Glazebrook account was not a botanical or taxonomic treatment but only an effort to discuss an interesting horticultural subject, with no intention of describing a new species or of relating the plant to other species. Martius, on the other hand, gave us a con-



238. SABAL DUGESII. × 1. Mature fruit and three views of seeds.

sidered taxonomic treatment, with citation of synonymy and literature. Of the two specific names, I adopt the one more likely to satisfy requirements of clarity and consistent record.

This palmetto appears to be frequent in grounds from Florida to the tropics, although I have nowhere seen it attain the height and majesty of some of the native trees on Hispaniola. It is told by its straight thick columnar trunk, heavy costa-palmate leaves, stiff leaf-segments, large long-acuminate hastula, inflorescences not equalling the leaves in length, large round although variable fruits, usually very productive.

Although much planted, *S. umbraculifera* seldom appears under its own name. Thus, I have taken it as *S. princeps* at Montebello, Guadeloupe, French West

239. SABAL UBEDANA, in northwestern Mexico. The foliage is glaucous-blue.

Indies, and at New Orleans, Louisiana; as *S. Blackburniana* in southern California; as *S. minor* and *S. mauritiæformis* in Demerara.

22. **Sabal Dugesii,** Watson ex Bailey, Gent. Herb. iii, 335 (1934). Fig. 238.

Stout tree to 10 m. high, trunk becoming bare; head rather close, the petioles short, leaf-blades decurved: inflorescences short, pendent in fruit, sheaths with points; rachillæ 6–10 cm. long, stout, nearly or quite terete, glabrous, thickly flowered: fruit largest in the genus, conspicuously depressed, 27 mm. across and about 17 mm. high, somewhat tapering to base, dark brown and glossy, containing a thick mesocarp that becomes spongy when dry; seed flattened, hollowed at base, 16 mm. broad and about one-half as thick, glossy, very dark brown, micropyle superlateral, small for size of body.

Habitat unknown. Botanical material was sent long ago to the Gray Herbarium, Harvard University, from Guanajato, central-southern Mexico, by Alfredo Dugès, and Sereno Watson gave it the herbarium name *Sabal Dugesii*, which I published in 1934. It could hardly have been native in Guanajuato, which is 6500 feet above sea level. I have not been successful in obtaining further information about the palm. Its evident relationship is with *S. umbraculifera*, and it is possibly an extremely large-fruited form of that species.

Dr. Dugès was French Consular Agent at Guanajuato, and professor of natural sciences in the college there; he died in 1910. He states that the palm grew on a rancho: "Palmier royal du rancho de Bustos, jurisdiction de l'etat de Guanajuato."

23. **Sabal uresana,** Trelease, in Rept. Mo. Bot. Gard. xii, 79, tt. 35–37 (April 1901); Bailey, Gent. Herb. iii, 332 (1934). SONORAN PALMETTO. PALMA BLANCA. Figs. 239, 240, 249.

Inodes uresana, O. F. Cook, in Bull. Torr. Bot. Club, xxviii, 534 (October 1901).

Medium tall and stout tree with trunk to 10 m. high and soon self-cleaning and then obscurely ringed; head open because of the very long petioles and hanging segments: leaves glaucous-blue and therefore conspicuous, the blade more or less waxy in feel, 2 m. or more across in either direction, midrib strongly decurved, abundantly filiferous in the sinuses; segments very many in their ultimate divisions above the basal part which may be 4 cm. broad but the main part is split along the midrib and each half may be only 1–2 cm. broad and prolonged into very long attenuate and filiform ends, the side veins regularly placed and close together and not joined by cross-hatching, palman about one-half length of blade; petiole 2–3 m. long, mostly exceeding the blade, strongly convex on under face, concave on upper face and more or less centrally ridged toward the top; hastula long, triangular-pointed, margins more or less upturned, 10–14 cm.

long: inflorescences or spadices much branched, about equalling the leaves, sheaths or spathelets with long sharp points but not costate: flowers closely placed, sessile or practically so, 3–4 mm. long, upstanding floral envelopes not costate, calyx shallowly and scariously notched, petals much longer than calyx and narrow-acute, nearly equalling stamens in anthesis, pistil prominent and about or nearly as long as corolla: fruit depressed-globose, 16–20 mm. across, the basal narrowed part very short, dull brown, the mesocarp edible until dry and fibrous; seed dark glossy brown, depressed, 12–14 mm. across and a little more than one-half as high, micropyle lateral or superlateral and prominent.

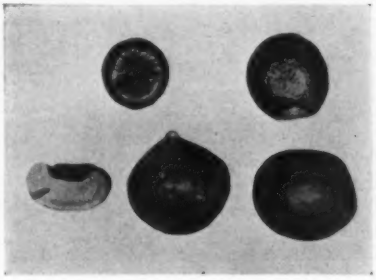
Northwestern Mexico in Sonora and Chihuahua, on the uplands and in valleys, first collected north of Ures near Hermisillo, by William Trelease. Vicinity of Hermosillo, Sonora, *Rose, Standley & Russell 12519.* Small colony on a bushy canyon floor, San Carlos Bay, Sonora, *J. M. Johnston 4345;* Nacapule Canyon, near Guaymas, *Bailey 26;* Tarahumare Mountains, and near the intersection of Fuerte and Chinapas rivers, southern Chihuahua, *George Lindsay.* A striking looking heavy palm because of its glaucous-blue color of foliage.

24. **Sabal Rosei,** Becc. in Webbia, ii, 83 (1907). Figs. 197, 241, 242.

Inodes Rosei, O. F. Cook, in Bull. Torr. Bot. Club, xxviii, 534 (1901).

Sabal uresana var. *roseana*, Johnston, in Proc. Calif. Acad. Sci. xii, 995 (1924).

Small slender tree to 18 m. tall, with self-cleaning trunk which at base may be 6–8 dm. in girth without a swollen base, coarsely or roughly ringed; head small, globular, open, the leaves relatively small and prominently curved: leaves green on both sides but with a bluish cast in certain lights, blade about 1 m. across either way, stiffish in texture, usually abundantly filiferous; segments 60 and more, narrow, about 4 cm. broad below main division, the blade cut nearly to base so that palman is very short, the points long and narrow-caudate, side veins many and prominent; petiole slender, about 1 m. long, convex on under face, nearly flat and centrally ridged on upper face, 3–4 cm broad toward base; hastula small, narrow, 5–8 cm. long, margins upstanding or inrolled: inflorescences or spadices 2 m. long, about equalling the leaves, profusely branched and floriferous; rachillæ very slender, terete, 6–10 cm. long, contiguously flowered: flowers light



240. SABAL URESANA. × 1. Northwestern Mexico. Two views of fruit, at bottom; three views of seed showing (above) the concave bottom and the rounded top; section at lower left, with embryo.

241. SABAL ROSEI as it grows in the bush near Tablon, in Sinaloa, northwestern Mexico. A small tree, with strongly costapalmate leaves which, however, are sometimes cut or split almost to the midrib.

straw-colored, faintly fragrant, sessile, 3–4 mm. high in full anthesis; calyx sparingly costulate, irregularly toothed, about twice exceeded by the narrow short-acute reflexed or spreading petals which are about equalled by the anthers, pistil usually prominent in the center: fruit globular, slightly narrowed to base, 17–20 mm. thick, blackish or bluish at maturity; seed 11–12 mm. across, 7 mm. high, inclosed in a mesocarp, micropyle small and lateral.

Northwestern Mexico, on dry levels and in hill country in states of Sinaloa and Nyaritt. Type station, near Acaponeta, Nyaritt, *Rose, Standley, Russell 14350.* Tablon, Sinaloa, *Bailey 18*, near Cofradia, *Bailey 19.* Trunks are used for timber and leaves for thatch.

25. **Sabal texana,** Becc. in Webbia, ii, 78 (1907). Rio Grande Palmetto. Palma de Micharo. Figs. 197, 242, 243, 244.

Inodes texana, O. F. Cook, in Bull. Torr. Bot. Club, xxviii, 534 (1901).

Sabal mexicana, Small, Fl. Southeast. U. S., 223 (1903), not Martius.

Inodes exul, O. F. Cook, in Circ. no. 113, Bur. Plant Ind. U. S. Dept. Agr. 14 (1913).

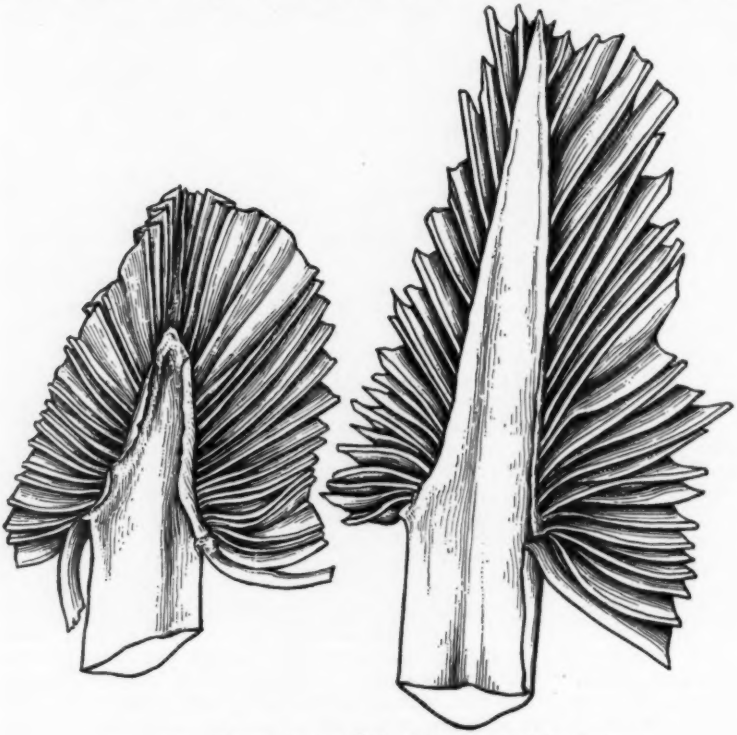
Sabal exul, Bailey, in Rhodora, xviii, 155 (1916).

Stout erect straight tree to 16 m. tall; trunk 8 dm. thick, brown or reddish after boots are shed, roughly ringed, self-cleaning with age but sometimes retaining boots toward the top until near maturity, particularly when the blades have been cut off; head or crown large and dense, globular, lateral leaves widely spreading and lower ones hanging as they die and commonly making a dense brown shag under the green top, segments of the horizontal leaves scarcely if at all hanging: leaf-blade 1 m. and more long and broad, moderately filiferous, light green, glabrous, palman one-fourth or more the total length; segments very many, to nearly or quite 1 m. long, central ones 4–5 cm. broad at base and the lateral ones narrower and shorter, tapering to 2 long points, midrib somewhat sunken on upper face but a prominent ridge on under face, the lateral veins many and thin, cross-hatching evident underneath under a lens; petiole stout, equalling or exceeding the blade, concavo-convex, centrally ridged toward top, hastula 12–20 cm. long, gradually long-pointed, margins upstanding or inrolled: inflorescences or spadices shorter than leaves or about equalling them, bearing pointed sheaths or spathelets and well separated small once-branched flower-clusters; rachillæ glabrous, slender, ridged in drying, 5–10 cm. long, diverging, mostly rather loosely but evenly flowered: flowers nearly white, fragrant, practically sessile, 4–5 mm. long at expansion and the petals erect, subtended by small sharp calyx-like bracts at base; calyx cup-like, prominently notched, strongly ribbed particularly when dry; petals narrowly oblong, short-acute, strongly ribbed, much exceeding calyx, about equalled by the short anthers: fruit sometimes twin or lobed, rounded-oblate, 18–22 mm. across and nearly as high, frequently smaller, provided with a short base or stalk, dull black when fully ripe, shell thin

and brittle at dry maturity but inclosing a sweet pulp when fresh; seed imbedded in the dried pulp or mesocarp, chocolate-brown, flat on bottom, convex on top, 11–14 mm. across, 7–9 mm. high, micropyle centrally lateral or superlateral, prominent.

Dry open lands, southeastern Texas, northeastern Mexico. Known in Texas mostly in the Rabb natural grove, once of about 215 acres six miles southeast of Brownsville, and scattered trees at Southmost, by mouth of the Rio Grande River, Cameron County; other reported occurrences are probably of introduced trees. The plant described as *Sabal exul* is introduced at Victoria, Victoria County, probably from Mexico, and is now seen there as a street and yard palmetto. Range of *S. texana* in Mexico is not determined, but there are groves of it in northern Tamaulipas near Matamoras, which is also the type locality, *Berlandier 877*.

This Rio Grande tree is supposed to have been the first native palm recorded within the present limits of the United States, mentioned by



242. HASTULAS ×⅓. Left, *Sabal Rosei*. Right, *S. texana*.

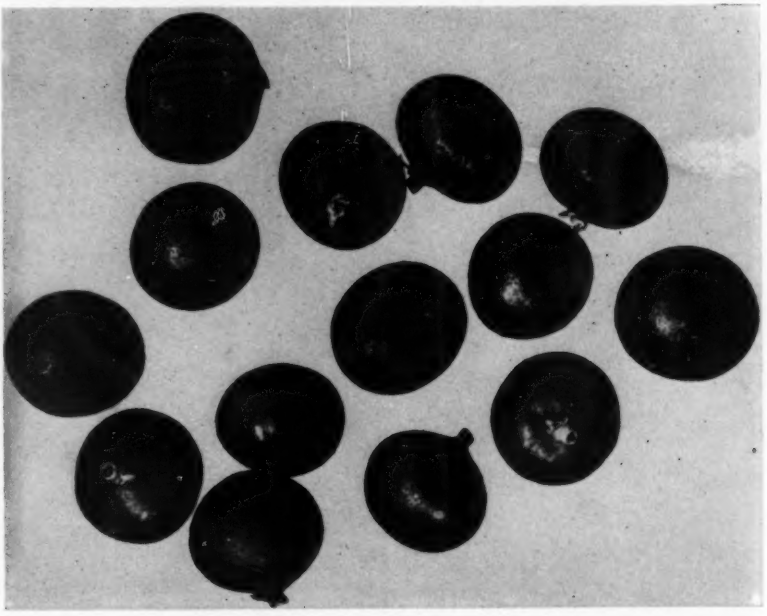
243. SABAL TEXANA, as seen in the lower Rio Grande region of Texas.

Cantino in 1502 (see John K. Small, Journ. N. Y. Bot. Gard., 1927, page 132). Robert Runyon of Brownsville states in an article that "the trunks make excellent fence posts and last for years when in contact with the earth. The fruit is edible and finds a ready sale in our own market. The leaves produce the best material for hat braid. . . . The leaves are also used extensively for thatch."

26. **Sabal mexicana,** Martius, Hist. Nat. Palm. iii, 246 (1838), plates S and V in vol. i, showing vegetative parts. Figs. 197, 245, 246, 247, 248, 249, 250.

Inodes mexicana, Standley, in Contrib. U. S. Nat. Herb. xiii, pt. i, 71 (1920).

Slender tree to 18 m. or more tall, but often fruiting when trunk is little developed; trunk often bent or leaning with age, coarsely ringed with separate step-like protuberances, eventually cleaning itself but likely to have a mass of boots with projecting old petioles on the upper part; head or coma not large or very dense and usually without a dense shag underneath the top, segments with hanging or very declined slender ends on the



244. Sabal texana. Fruits natural size, from the Rabb grove of native trees near Brownsville, Texas.

245. SABAL MEXICANA. Juvenile plant, separate leaf and hastula, taken in the wild at Chacahua, state of Oaxaca, southern Mexico, at the place where the first seed was collected and matching Martius' picture of foliage grown under glass in Munich.

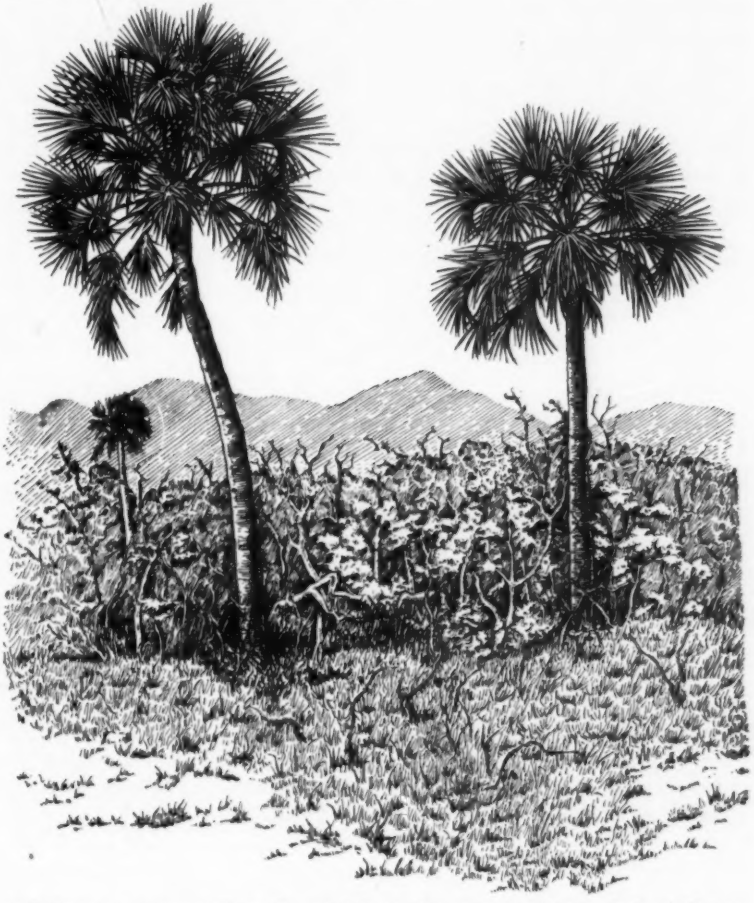
horizontal leaves: leaf-blade 1 m. long and broad more or less, moderately filiferous, light green, glabrous, palman one-fourth to one-half the total length; main segments 1 m. or more long, 4–6 cm. broad at middle or base and lateral ones shorter, tapering into very long attenuate ends, midrib sunken on upper face, elevated and prominent on under face, lateral veins many and faint and cross-hatching sometimes apparent; petiole slender, about equalling the blade or exceeding it, not deeply concave above, the hastula mostly not exceeding 10–13 cm. long and upturned margins usually not prominent: inflorescences or spadices usually equalling or a little exceeding the leaves, the sheaths or spathelets with short broad not attenuate tips, internodes short so that the flower-clusters are close together, giving the spadix a crowded look; rachillæ glabrous, slender, ridged or angled in drying, to 12 cm. long, diverging, commonly closely flowered but variable in this respect: flowers nearly white, fragrant, small, 3–4 mm. long and petals spreading, subtended by small calyx-like bracts at base; calyx cup-like, notched, somewhat or faintly ribbed; petals narrowly oblong, acute, somewhat ribbed, exceeding calyx and about equal to anthers: fruit simple or twin, often in dense grape-like clusters due to fertility and the compact inflorescence, irregularly rounded-oblate, flat on bottom, 13–20 mm. across longest way, about 15 mm. high, with a very short stalk, with a thick mesocarp; seed flat on bottom, convex on top, chocolate-brown, about 9 mm. across, micropyle centrally lateral.

Mexico, on intermediate high lands and on lower but usually dry areas, range undetermined. Type or original locality in the coastal Pacific region of the state of Oaxaca in southern Mexico. It apparently extends southwards to Guatemala and northwards to the neighborhood of Monterrey in Nuevo Leon, being the prevailing Sabal within that extended region, displaced on the western slope north of the Mexico City region by *S. uresana* and *S. Rosei*. It may not be the only species of Sabal in that region.

This, above, is the first full diagnosis from nature of the plant we now know as *Sabal mexicana*, and the story may be told.

The species *Sabal mexicana* was founded by the illustrious Carl Friedrich Philipp von Martius (1794–1868), of Munich, Germany, in a fascicle published in 1838 as part of Volume III of his great quarto work, Historia Naturalis Palmarum. In Volume I, when discussing morphologies of the palms, he had depicted a leaf of the plant as well as details of seedlings, but he presented no taxonomic picture of the species. He states that the palm was discovered by L. B. de Karwinski in the warm maritime region of Mexico "ad Chacahagua, prope Jamiltepec" province of Oaxaca, as well as near Tehuantepec. His description is not sufficient for identification of a palmetto in these later days, and his reference to it of palms grown as *S. umbraculifera* and *S. Palmetto* extend the doubts. Perhaps Martius' technical description is of less consequence in identification than his informal remarks. He states that Karwinski brought back dried flowers, and also fruits that were contributed to the royal gardens at Munich. The

plant collected at Chacahagua was acaulescent but nevertheless fruitful; that observed at Tehuantepec was similar in leaf and fruit but the tree was 20 feet tall. The plant must have been grown under glass at Munich from the Chacahagua seeds, and the general description made from that material, as well as the foliage pictures in his Volume I. We do not know any complete Martius specimens of the species, although there are fragments in certain herbaria collected subsequently in southern Mexico by Liebmann, supposed to represent the species.



246. SABAL MEXICANA. Trees in wooded country near La Venta, state of Oaxaca, southern Mexico.

Martius knew three species of Sabal well enough to describe them—*S. umbraculifera*, *S. Adansonii* (*minor*), *S. mexicana*, and he mentioned other dubious names in the literature. The first is a real tree; the second, *S. minor*, is commonly acaulescent with palmate leaf-blade; *S. mexicana* he compares with *S. minor*, and the leaf he figures confirms the similarity, the rib extending only about one-third the length of the blade. The leaf is not at all costapalmate, and presumably the original plant was not a tree. Therefore, in my Sabal monograph, 1934, I placed *S. mexicana* in the section Eusabal with *S. minor*, with palmate leaves, even though a palm of this kind had not been subsequently reported from Mexico.

In the meantime the name *mexicana* has been applied to different Sabals, as to *S. parviflora* and *S. Yapa* of Cuba, and to *S. texana*. Beccari in describing *S. mexicana* in 1907 (Webbia, ii, 52) accounts for only the spadix and flowers, due undoubtedly to the fact, as he states, that the Karwinski material seen by him in the herbarium at Munich comprises only part of a spadix in flower and no leaves or fruits.

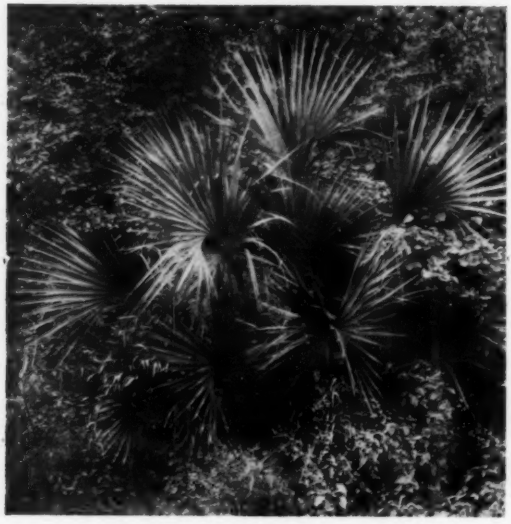
To understand this palm and to determine the application of the name *mexicana* required an exploration. At least Chacahagua (now spelled Chacahua) and Tehuantepec must be visited with this objective. I undertook the journey in 1940 for this particular purpose, comprising a six weeks effort, even though I had previously collected palms in various parts of Mexico.

The name Chacahua applies to a region on the Pacific shore of the State of Oaxaca far south of the City of Mexico. One who travels in Latin America does not look for laid-out highways to remote places, as the character of settlement and state of affairs have not required them. There are trails connecting certain places, over which wheeled vehicles may not pass, but which are available for burros and other animals. Such was the access to Chacahua. I tried in vain to reach the area by boat from Salina Cruz on the Pacific side of the Isthmus of Tehuantepec, and also at the north from Acapulco in the State of Guerrero. To have made up a train of burros from the city of Oaxaca or elsewhere for a journey overland would have taken too long and heavy rains might have made such an effort impracticable. At last I hired a monoplane that had recently landed by Acapulco, and it took me as far as Ometepec in the southwestern part of Guerrero, a region that tourists do not visit. I had a good native Mexican as helper and guide. The plane returned immediately to Acapulco, inasmuch as the landing field was only a space roughly cut in the chapparal on a hillside remote from the settlement and where a plane could not be left for a night. The following day a plane took us to the region of Tututepec in the State of Oaxaca, landing us on an area cut in the forest where there were no buildings or people but where two saddled horses stood alone tied

247. SABAL MEXICANA, as it grows in southern Tamaulipas, Mexico, a slender tree of variable trunk diameter, soon shedding its petioles.

at the edge of the bush. We appropriated the horses and rode many kilometers over trails and around mountain sides, until we arrived at the settlement of Tututepec, a remote and interesting hamlet where no wheeled vehicle was in existence. There we headquartered, until by horseback and other means in a few days we made the journey to the Laguna of Chacahua, a brackish backwater from the ocean, in an ancient dugout or cayuca that required constant bailing. At Chacahua there was no organized settlement but a more or less nomadic small population, and of course no provision for visitors. The conditions were very primitive.

This area is now in a reservation called El Parque Nacional Chacahua, but the coastal region is not opened to regular travel from the interior. An account of the area by Ing. Antonio H. Sosa may be found in Boletin del Departamento Forestal y de Caza y Pesca, iii, number 8, 1937. Coastal boats on the Pacific enter the Laguna now and then to pick up whatever freight may be assembled on the shore. Considerable piles of cargo were being accumulated when I was there in April. They said a ship might stop there, probably in June, and take the produce of woods and certain fields to market; if not in June, one was almost sure to come in October. I could imagine that Karwinski had come on such a ship more than one hundred years ago and had collected the palm seeds that subsequently fell into the hands of Martius and from which *Sabal mexicana* was grown at Munich. However, such assumption in respect to the Karwinski journey is not essential; Martius, as we have seen, speaks of "Chacahagua, prope Jamiltepec," as if the approach may have been made from the interior through that settlement. I saw Jamiltepec at the left from the plane as I flew eastward to Tututepec.



248. Sabal mexicana. Arrested development, in a difficult situation.

I had travelled the length of Mexico and had not found a pal-

mate-leaved Sabal to answer the diagnosis and picture of *S. mexicana*. I had begun to wonder whether the palm grown at Munich had yet passed the juvenile stage and whether the species might not be in reality a costapalmate large tree. I could find no juveniles in the Sabal groves I had visited for either the areas had been burned (the country being very dry) or the young trees had been cut for uses by the natives. At Chacahua, however, in the thick bush at about sea level I found young and virgin plants, one of which is shown in Fig. 245, the leaves of which match Martius' figure; and near at hand were tall trees of bearing age and costapalmate leaves, and also trees of intermediate stature. Then I understood that the authentic account of the living plant of *S. mexicana* was drawn from the juvenile stage of the palm as grown at Munich, with brief characters of flowers and fruits derived from materials sent by Karwinski. The palm Karwinski saw at Chacahua was probably a mature stage even though acaulescent, perhaps like that seen in Fig. 248.

Let it not be understood, however, that we have solved all the taxonomic problems connected with *Sabal mexicana*, but only that we have a starting-point. Whether there is more than one species in this great region or whether *S. mexicana* is confusingly variable no man yet may say.

In herbaria I have seen leaves of dwarf palmettoes from the Mexico-Guatemalan region, always without flowers or fruit, that appear to be the same as my juveniles from Chacahua. All collectors of palm materials should be sharply aware of a primary or juvenile stage, particularly in the palmettoes, and be on the alert for the mature or fertile plant.

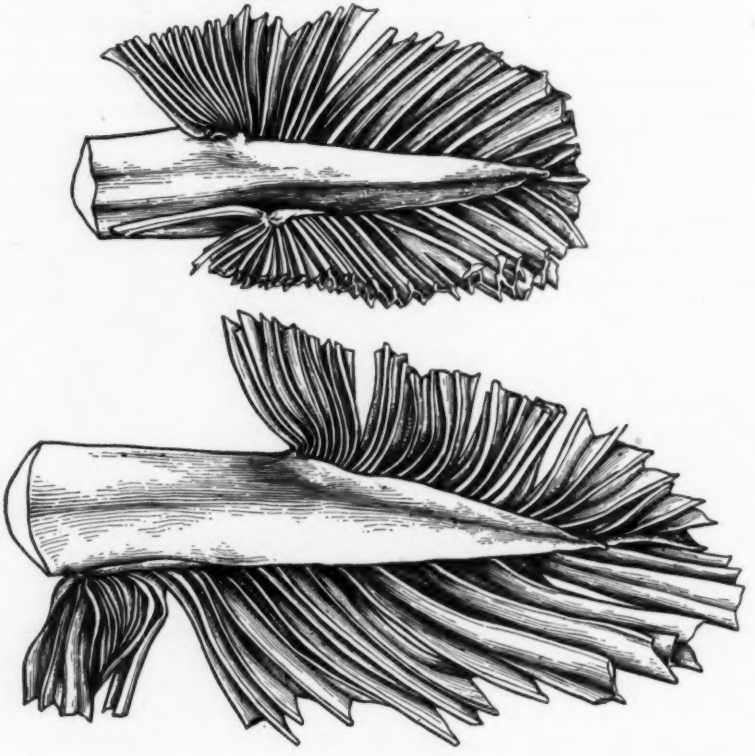
Identity of *Sabal guatemalensis*, Becc. (Webbia, ii, 68, 1907) is obscure and we are not yet qualified to deal with it. The species was founded on specimens collected in Guatemala by Skinner, without stated locality, and representing only flowers and part of inflorescence, in the Berlin herbarium. Branchlets bearing immature fruits were collected in August, 1887, at Cario, Guatemala, supposed to represent the same species. Beccari made no account of the tree, the foliage, or the mature fruit.

The partial inflorescence or spadix of *S. guatemalensis* is described as robust, 80 cm. long; rachillæ angled and very slender, 10–12 cm. long and 1.5 cm. thick, subulate; flower-buds oblong, 4–4.2 mm. long, 1.8 mm. thick, rounded at end; calyx urceolate, not constricted at mouth, fleshy-thickened, not costate or veined or only inconspicuously so when dry, rounded at base; corolla twice longer than calyx, petals oblong, conspicuously costate-nerved; filaments subulate, incurved-ascending; ovary pyramidal, 3-angled, 3 mm. long. The details are well figured by Beccari in Annals of the Royal Botanic Garden, Calcutta, xiii, t. 20 fig. E (1931), to-

gether with young fruits from the Cario collection. Inasmuch as there may be more than one Sabal in Guatemala one cannot name specimens from that country as *S. guatemalensis* unless the floral details match these Beccarian pictures; and even then one would wish to compare with the type specimen if it yet exists. The picture is reproduced herewith (Fig. 251).

Flowers of *S. mexicana* from southern Mexico are sufficiently like Beccari's diagnosis and picture of *S. guatemalensis* to raise the question whether the two may not be the same species. We are to allow for variations in flowers of Sabal taken at different ages and kept under differing conditions.

Moreover, specimens from Guatemala appear to be indistinguishable from Mexican specimens supposed to be true *S. mexicana*.

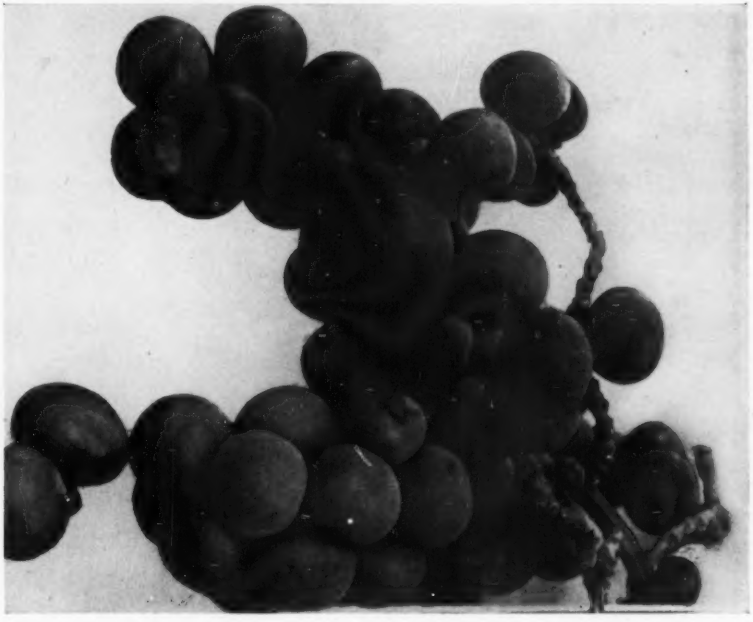


249. Sabal uresana, state of Sonora, northwestern Mexico, at top. Sabal mexicana, hastula from tall old tree near Chacahua, state of Oaxaca, southern Mexico, at bottom. Both × ⅓.

I have seen part of a Sabal inflorescence from northern Guatemala that appears to be unlike either *S. mexicana* or the Beccarian *guatemalensis*.

Unidentified Binomials

Seeds of palmettoes are small, hard and attractive, and abundantly produced. They have easily been carried far and wide over the earth. They soon produce trees in tropical nurseries and botanic gardens. The trees from which they came may not have been recognized or even botanically known. Novel names have been given them in lists. Thus it comes that many unidentifiable binomials appear in the literature of a century and more, some of which may not be Sabals at all; and thus it is, also, that new species have been made known from cultivated plants, as *S. minor*, *glaucescens*, *peregrina*, *viatoris*, *Questeliana*, *Beccariana*, *mexicana*, probably *umbraculifera;* and others will undoubtedly appear when we begin careful studies of cultivated floras. Names that are mere *nomina nuda*, without any means of identification, need no longer be listed, but the following still remain to perplex us.

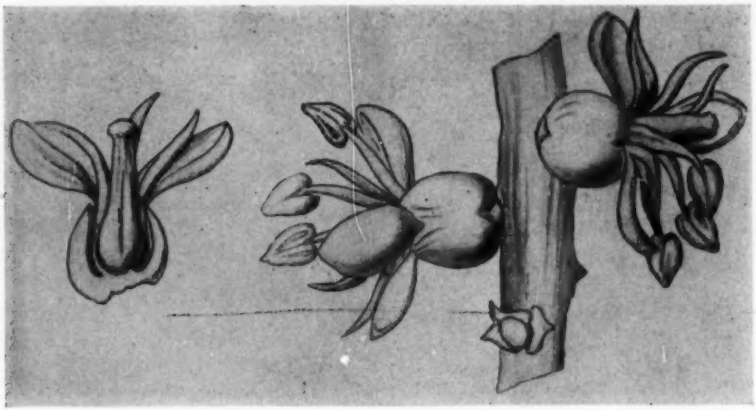


250. Sabal mexicana. Fruits natural size photographed when fresh from the tree; Juchitan, Isthmus of Tehuantepec, southern Mexico.

Ghiesbrechtii. This is a floating name, and apparently covers different species. It has not been botanically stabilized, and the name should not be continued. See Gent. Herb. iii, 336; also *S. peregrina*, No. 5 herewith.

maritima, Burret, in Fedde, Repert. xxxii, 101 (1933). *Corypha maritima*, HBK. Gen. Nov. et Spec. i, 298 (1815). The account of *Corypha maritima* in HBK is not sufficient to identify the species intended. Flowers and fruits were not known. In an unpublished manuscript on the Cuban palms, made many years ago, the late N. L. Britton transferred the name *maritima* to Sabal and made it replace *Sabal parviflora*, Becc. In Webbia, 1907, and again in the Palms of Cuba, 1912, Becarri questions whether *maritima* may not be *S. Yapa*, and this is the more probable disposition. Or there may be a third species at Batabanó, the accredited station. It must remain a *nomen incertum*.

princeps. This name was discussed in my palmetto monograph (Gent. Herb. iii, 329) and again in iv, page 386 when I took out one of the palms so named and published it as *S. Beccariana*. The binomial *S. princeps* has been a floating troublesome name, applied to different species, some of which we are yet unable to identify. Partial descriptions have been made as incidents to non-taxonomic papers, but the only palm actually described botanically under this name is by Beccari as "Sabal princeps Hort." not as a new species. It might be argued that the name *princeps* may be conserved on this publication and all the others discarded as *nomina nuda* or *nomina incerta*. This, however, could not meet the problem before us. As long as the name *princeps* is maintained the confusion will remain, for we cannot expect planters to discriminate species in Sabal, and the plants are



251. Sabal guatemalensis, after Beccari. × 7.

received as juveniles and cannot be distinguished botanically. The only clear solution is to eliminate the binomial.

Pumos, Burret, in Fedde, Repert, xxxii, 101 (1933). *Corypha Pumos*, HBK. Nov. Gen. et Spec. i, 298 (1815). The HBK account calls for a tree 6 to 12 feet high ("caudex bi-aut quadriorgyalis"), with leaves 5 feet long, filiferous, segments lanceolate and bifid; spadices 3–4 feet and more, branched, pendulous, solitary; flowers unknown; fruit a spherical drupe ½ inch in diameter, short-pedicelled, fibrous and succulent, black at maturity; seed globose-depressed. The palm was found by the volcano Jorullo and on plateau of Agua Sarco (presumably in Michoacan), Mexico. Beccari in Webbia, 1907, questions whether it may not be the plant later described as *Sabal Rosei;* but the fruit of *Rosei* is too large for *Pumos* and it is not spherical. The description of *Corypha Pumos* places it in the class of small-fruited tree palmettoes. The late Dr. Dugès sent a palmetto to Sereno Watson with the query whether it might not be *Corypha Pumos;* but the fruits were twice larger than those of *Pumos* and quite contrary to spherical; his plant appears in this monograph as *Sabal Dugesii*, No. 22. We are to expect *Sabal Pumos* to be rediscovered when the palmettoes of Mexico are thoroughly collected.

Erythea loretensis. This binomial begins with M. E. Jones in Contribution to Western Botany, number 18, described from a single tree in a village, apparently planted. He made no Latin diagnosis. I have fruits from Jones' original collection at Loreto, eastern side of Baja California, latitude 26° N.; they are Sabal, and match well with mature fruits of *S. texana.* I have seen the few palmettoes planted in Loreto on two journeys, and the trees have the aspect of *S. texana,* as my photograph also shows. Blake and Morton have investigated the publication of Contribution number 18, and find that the pages containing *E. loretensis* were not available until April, 1935, past the date at which Latin diagnoses are required for valid nomenclature. I therefore do not make transfer of the name *loretensis* nor account for it under *S. texana.* In my Erythea paper (Gent. Herb. iv, fasc. iii, 1937) I stated that *E. loretensis* "is a Sabal and will be discussed when I revise my Palmetto monograph."